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ABSTRACT

This study examined the benefit of using a visual telecommunication system for Sweden's children and adults with mild to moderate mental retardation and speech difficulties. The Panasonic Image Communication Unit connects to standard modular telephones and includes a camera and monitor for the transfer of pictures. Units were placed in eight subjects' homes; day-activity centers; and the homes of friends, relatives, and support families. Results after 5 months indicated that four of the five adult users and two of the three child users (ages 6 to 12) increased their use of the telephone during the course of the project and attained a functional use of the system. It is concluded that the still picture telephone can contribute to increasing the possibilities for social contacts. This is based on the project findings that still picture telephoning gives both visual and auditory information, the frequency of usage increased over the course of the project, the motivation increased, telephoning became more independent, initiative to use the telephone increased, and the pictures became more relevant and functional. Appendices provide background information given to program participants and various recordkeeping forms. (27 references) (JDD)

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Evaluation of Still Picture Telephone for Mentally Retarded Persons

October -91

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Telematics and Mental Retardation

Evaluation of Still Picture Telephone for Mentally Retarded Persons

Jane Brodin and Eva Björck-Åkesson

Stockholm, October, 1991

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Foreword

The overall purpose of the "Telematics and Disability" project has been to study problems and possibilities that the telecommunication technology brings about for persons with various functional disorders. Consequently, the studies made in the project have analyzed the special needs and conditions of various groups of disabled persons in relation to telecommunications. But even some studies of technology and technical development have been made.

The group that consists of mentally retarded people has entered the project work rather late. This is partly because, in project management, we have felt an uncertainty about the best way of running this work, not least when it comes to practical trials. In connection with the basic study about Telematics and intellectual disability and – in parallel with it – contacts with research workers within the field of mental retardation, it became progressively more clear that picture communication has a potential to become an aid which could facilitate telecommunications for intellectually disabled people.

Approximately at the same time a still picture telephone, capable of being connected to the ordinary telephone network, was introduced on the Swedish market. This telephone became the first – but hopefully not the only – picture communication aid to become used in practice by some mentally retarded people. Both the procedure and the results are described in the enclosed report.

It is exciting reading that the two research workers – Jane Brodin and Eva Björck-Åkesson – present. And the result is no less interesting. It has already given rise to new project plans for other groups of intellectually disabled people and with other types of picture transmission.

As always in the report series of the Telematics and Disability project, the research workers themselves are responsible for the report and the accounting of the result.

Jan-Ingvar Lindström
Project responsible
Telematics and Disability

Authors' Foreword

Evaluating the Panasonic still picture telephone for children and adults with an intellectual disability has been a pleasant and stimulating task. The problems were many, especially at the start of the project, but never insurmountable.

In performing our study we have had valuable assistance by knowledgable and motivated personnel from the Backen day centre, the Draken day centre and the Kungsholmen day centre as well as personnel from the home groups of the mentally retarded project participants. We want to express our warm thanks to everybody involved.

We also want to express our warm thanks to the parents of the three children and to their telephone partners. We are aware that the demands on the parents have been hard. They have been training their children in picture telephoning in the evenings, after the day's work, and we know that is has sometimes been difficult to motivate the children, who have likewise been tired.

The parents of the two adults who are living with their parents – in the report called Eva and Anders – deserve especially warm thanks. They have spent much time and work in the project, showing great interest and involvement.

Finally we want to express our warm thanks to work therapist Gunilla Granberger for her constructive points of view on the design of the report forms.

Thank you all for your interest and for all the practical work you have performed, enabling us to carry the project through!

Stenhamra, April 1991

Jane Brodin Eva Björck-Åkesson

Summary

The focus of this study is the benefit of using a visual telecommunication system for children and adults with a moderate mental retardation.

During the eighties a number of devices that facilitate telecommunication have been introduced on the market, for example automatic dialling and loudspeaking telephones. A recent development is a visual telecommunication system, with a camera and monitor for the transfer of pictures, that connects to the standard modular telephone. The unit makes it possible to show snapshots of the person you are talking to or to show signs and pictures such as photos and Pictograms, providing that the partner has a visual telephone. Pictures may be sent at regular intervals, and the unit also contains an image memory which stores the last images that have been shown. This kind of telephone gives the user both auditory and visual information during the course of the telephone conversation.

It is well known that using the telephone may be difficult for many people with a mental retardation. The difficulties may depend on operational and sociorelational factors, and also on cognitive factors. In order to use the telephone a person must be able to operate the telephone, have someone to call, be able to converse with other people on the telephone and also be motivated and understand the function and benefits of telecommunication.

An underlying assumption in this study has been that a visual telecommunication system may facilitate the use of the telephone for moderately mentally retarded persons. Graphical systems for picture communication are used by many mentally retarded persons to augment and increase the communicative competence. With a visual telecommunication system the pictures may function as a support to speech and also facilitate memory functions. With both auditory and visual information the telephone conversation may thus become more similar to a face-to-face conversation.

Five adults and three children with a moderate mental retardation have been using a visual telecommunication system (Panasonic Image Communication Unit, WG-R2) for about five months. The telephones have been placed in their homes, in day-activity centres, and in the home of friends, relatives and support families. Each person has had at least on still picture telephone to call besides the one in the home.

The following questions have been in focus in the study:

- What use may a person with a moderate mental retardation have of a visual telecommunication system in the activities of daily life, and does it enhance independence?

- Is telephone conversation for persons with a moderate mental retardation facilitated by a visual telecommunication system?

- Could a visual telecommunication system be regarded as a communication aid for persons with a moderate mental retardation?

The communicative competence of persons with a moderate mental retardation when using the visual telecommunication system has been studied from the operational and sociorelational perspective. The form, content and function of the telecommunication have been in focus. Data about conversations over the visual telephone have been collected by means of detailed report forms, diaries and interviews.

The results of the study show that four of the adult users and two of the children have increased their use of the telephone during the course of the project. These persons have attained a functional use of the visual telecommunication during the project time, and the system has facilitated telecommunication for them. For persons with a moderate mental retardation the following conditions are important:

- the user has a need for using the telephone in daily life
- the conversations occur naturally
- the user is able to initiate telephone conversations
- there is a cooperation between persons who support the user
- there are possibilities to call different persons
- the user experiences the use of the visual telephone as relevant
- support is provided from the environment
- the visual telecommunication has functional adaptations
- the visual telecommunication system is used continuously.

To conclude, this study shows that moderately mentally retarded persons may benefit from using a visual telecommunication system. Most of the persons in this project use the system functionally and it seems that their possibilities for independence have increased by use of the system. It is also concluded that a visual telecommunication system may be regarded as a communication aid for persons with a moderate mental retardation.

1. Introduction

The basis for Swedish policy with regard to disabled people is to give persons with various functional disorders a possibility to live under the same conditions as other citizens. The emphasis is on equality and possibility to live as normally as possible, i.e. as far as possible like other people. The overall objectives are participation and equality, and various institutions in Society are charged with the task of increasing the possibilities for people with functional disorders to attain these objectives by means of various adaptation and support measures.

Technical development today seems to proceed ever faster, not least within the telecommunication area. However, in order for technical progress to be utilized by persons with functional disorders, it is often necessary to adapt both the equipment and the information to be transferred. Earlier studies within the Telematics and Disability project (Andersson, 1988; Dopping, 1989; Levin, 1989; Roos, 1988) directed primarily to people with a visual or hearing disability have shown that technology in itself offers possibilities for participation by disabled people, but they also show the need for adaptation of technology to man for avoiding difficulties. It is in the interest of Swedish Telecom that as many people as possible should use the telecommunication possibilities (Brunér & Hampshire, 1987) and "communication from everyone to everyone" is a motto for Swedish Telecom. This means that Swedish Telecom is interested in enabling even people with functional disorders to use the telecommunication network.

Access to telephone communication is now taken for granted by most people, and we consider it as necessary for keeping contact with our environment. However, many mentally disabled people find it difficult and complex to use the telephone. In special schools for mentally retarded children and in day activity centres for mentally retarded persons[1)], much time and effort is devoted to teaching mentally retarded people to use the telephone. For several reasons, however, far from all results are positive. The limiting factor can be in the person with the functional disorder or in the equipment. Mentally retarded people can have difficulties setting up a call, but they can also have problems understanding in which way the telephone can be of value. Many of them have additional disabilities of varying kind and degree, necessitating adaptation of the telephone equipment, e.g. a motor disability. Nowadays we can connect various types of automatic diallers to the telephone in order to facilitate calls. Another

[1] In the sequel briefly called day centres, abbreviated as DC.

adaptation would be to provide a loudspeaking telephone for a person who cannot easily hold a telephone receiver.

Mentally retarded people often find it difficult to understand the usefulness of being able to handle the telephone without help. He or she needs both determination and motivation in addition to having a message to bring across. Telephoning is a way of getting a message across, a way of communicating, and the same basic principles are valid for telephoning as for other kinds of communication. A mentally retarded person may have to exercise both dialling and listening to the other party. In addition, he or she may have to exercise presenting a message. A person whose mental retardation is mild can often learn to telephone without help. For people with a moderate mental retardation, the reduced capability of understanding symbols is generally a obstacle to independent telephoning because the digits on the dial or pushbuttons do not provide sufficient information. With an automatic dialler, where a single button has to be pressed, this obstacle can be fully or partly eliminated (Göransson, 1984; von Tetzchner, 1990).

During the 1980s several graphic systems or picture communication systems have begun to be used in Sweden. Some examples are Bliss, Pictograms and Bildkommunikation (Picture Communication), but also photos and self-drawn pictures are used (Andén & Brodin, 1984). Blissymbols were introduced in Sweden as early as in 1976, but using this system requires a relatively good abstraction capability (Björck-Åkesson, 1983). When the Pictogram symbols were introduced in 1981, this opened possibilities for mentally retarded people to get a symbol which is better adapted to their mental capability (ibid.). Both Bliss and Pictograms are based on pictures as an information medium, and the primary user groups are motor impaired and mentally impaired people with disorders of speech and communication. Symbol communication is used as a substitute for speech or as support for speech when the speech does not function well.

Internationally, this type of communication is called "augmentative and alternative communication" (AAC). Communication equipment is often – but not always – involved in AAC (Brodin & Björck-Åkesson, 1991; Kraat, 1985; Larsson & Brodin, 1988; Light, 1989). Various kinds of symbol boards with graphic pictures or photos are frequently used in AAC. The user of such a board points to a part of it with his eye, his finger or some other part of the body in order to present his message. In addition, more or less advanced technical aids are used in AAC.

Mentally retarded people can more easily grasp a message when speech is augmented with a picture, i.e. when an auditory stimulus has been augmented and reinforced with a visual one. Pictures have always been of great importance in conveying information. For mentally retarded people, pictures can be seen as an aid for the reinforcement and support of speech – which may otherwise not function well – as well as for learning of concepts and for exercising various functions, e.g. as a support for memory. Lately, pictures have also got increased importance as a compensation for the mental disability, e.g. for marking items in the near environment with adequate symbols. At home, for instance, a drawer containing socks can be marked

on the outside with a picture of a pair of socks for the benefit of a mentally retarded person. Symbols can also be used for adaptation of various communication means, enabling mentally retarded people to use them (Larsson & Brodin, 1988).

Both still pictures and moving pictures can now be transmitted via the telecommunication network. A small number of still picture telephones of various brands are now available on the Swedish market for connection to an ordinary telephone. The still picture telephone contains a camera for still pictures and a monitor. The user can send both a "frozen" picture of himself and e.g. a photograph or other picture. Transmission of a picture over the telecommunication network takes around ten seconds. Panasonic's still picture telephone WG-R2 also allows storing the last six pictures, which can later be shown on the monitor. For a mentally retarded person this option can be of advantage because he can look at and talk about the transmitted pictures after the telephone conversation, e.g. together with a parent or other person. Those who use Bliss or Pictogram symbols in their everyday communication can transmit symbols via the telecommunication network by means of a still picture telephone.

Being mentally disabled means having an intellectual disorder which affects the ability to understand concepts connected with time, space, quality, quantity and cause (Kylén, 1981). Furthermore, the ability to understand symbols such as digits, letters and pictures may be more or less limited. In addition, the memory function is often reduced, especially the short-time memory. For a person with a mild or moderate mental disability, seeing the picture of another person in addition to hearing a well-known voice in the telephone receiver should thus in all probability be of great help. It is reasonable to assume that this experience will stimulate the mentally retarded person to increased contacts. This, in turn, will lead to increased independence of the individual. The project presented in this report is aimed at finding out which use mentally retarded people can have of still picture telephones in their daily life.

Kylén (ibid.), like Piaget (1971) and H Eriksson (1986), uses a subdivision into stages in describing people with a mental disability and their level of development. This subdivision into stages is based on levels of abstraction. As seen from the standpoint of this theory, the persons involved in this projects are on either level B or level C, meaning that they are mildly to moderately retarded. This does not imply, however, that we deem persons who are severely retarded, i.e. on level A, to be unable to benefit from a still picture telephone. Probably even persons with the most severe mental disabilities could benefit from this type of communication, but on a different level and as seen from another basis for judgement.

The more or less pronounced difficulties – stemming from lower short-time memory capacity and a lower level of abstraction in thinking – that more or less clearly characterize mentally retarded persons are a reason for assuming that mildly retarded persons are, with a great probability, those who can benefit most from a still picture telephone from the point of view of telephoning. However, we want to point out that this assumption does not stand on scientific

ground. It should sooner be looked at as the hypothesis or idea we had at the beginning of the project.

We have not wanted to lock ourselves to a certain level of development – such as the stages used by Kylén or IQ (Intelligence Quotient) – in selecting test persons. Instead, we have based the selection on the mentally retarded person's functional level in a way similar to the one Lilli Nielsen and Birgit Petersen (1984), among other persons, have done in their educational function model. According to this model, it is assumed that one and the same person can be on different levels of development in different situations and respects. Thus, we have based our selection on what the persons are believed to be able to cope with. To get an idea of this capability, we have asked parents and personnel to estimate each person's degree of mental retardation. However, this judgment is often based on the tests performed by a psychologist within the service system for mentally retarded persons. Most of the persons in the project are moderately retarded. In this report, concepts like intellectually disabled and mentally retarded are used synonymously.

2. Communication, Telephoning, and Mental Disability

A mentally disabled person has a simpler and more concrete concept of reality than a person with normal talents. The difficulties are related to the way perception, guiding and symbolizing of the thoughts are structured and to memory functions.

About 70 % of all mentally disabled people have speech disturbances or speech impairment (Luftig, 1982). For persons with severe mental disability and severe additional disabilities the same figure is nearly 100 % (Brodin & Lindberg, 1990). In spite of great efforts during the last few years, mentally retarded people with speech disturbances are a neglected group when it comes to communication aids. This is true especially of adults who have not had access to any alternative way of communication in their earlier lives. Today there are a great number of computerized and electronic communication boards on the market, but in many cases these boards need adaptation in order to become more accessible to the retarded people. Furthermore, it is necessary to develop methods for introduction and training in the use of this communication aid. However, it had turned out that consistent and well adapted communication training together with suitable aids can enable many mentally retarded persons, who cannot use speech today, to communicate (Brodin & Björck-Åkesson, 1991; Granlund & Olsson, 1987; Johansson, 1988; Kraat, 1985). Even if communication is limited, it can contribute to the person's capability to exert influence on his environment and make his own choices, which is important for personal development, independence, social life participation and quality of life.

Telephoning is a way of communicating, even if it can be difficult and complex for many people with a mental disability. The degree of communication ability depends on the individual's status (physical and psychological), on the environment's requirements and status (physical and social) and on access to AAC. Among other things, the person must be motivated and willing to communicate, able to identify and classify pictures and objects, and in possession of sufficient perceptual functions and motor ability. The person must also be capable of coordination and indication. In addition, the environment must be positive and inclined to receive information. Thus, relatively hard requirements are imposed on the mentally retarded person and the person who is to communicate with him or her. Light (1985) has expressed a model of communicative competence in terms of

functional aspects, sufficiency and skill. Skills are subdivided into operational capability, linguistic capability, sociorelational capability and strategic capability. When it comes to using a still picture telephone, all these aspects are relevant.

Kylén (1983) describes communication as a social process, subdivided into ten links of what he calls a communication chain. These links are:

1. Idea (idea stemming from sentiment or knowledge)
2. Will (will to share one's idea with someone)
3. Translation. The idea must be translated into a language
4. Sign production with gestures, pointing etc.
5. Media. Choice of method for getting the message across
6. The receiver must be able to comprehend the sign
7. The receiver must be willing to receive the message
8. The receiver must be able to interpret the message
9. Understanding what the communication partner wants to bring across
10. Confirmation. The receiver confirms understanding the message, e.g. by nodding his head.

The communication process is dynamic, and the various steps interact continuously. The will to communicate depends on motivation, implying that one has to know what one wants, how to attain the objective and what one gets from reaching the goal, i.e. what the yield will be. A mentally retarded person has a limited short-time memory and in many cases limited motor ability. Even if the person with a mental disorder gets help with dialling, he or she may have no message to bring across or may not understand that the voice he or she hears does not originate in the telephone receiver. Göransson (1984) tells about a girl who was very confused by hearing her mother talk in the telephone. She looked into the telephone receiver and did not dare to say anything, evidently because of her bewilderment. Therefore, according to Göransson, it is important to really teach mentally retarded persons to communicate over the telephone and understand what it means.

Motor disability can cause difficulties in telephoning. If so, an automatic dialler may be a suitable aid. Such a dialler is preprogrammed. All that is needed for dialling a predetermined telephone subscriber is pressing a button. This limits the choice, but it can be a method for training telephone communication as such. There are also loudspeaking telephones for those who cannot hold the receiver. The technical solutions are numerous, and the technicians in technical aids centres help adapt communication equipment.

It is important to bear the importance of memory functions in mind in connection with various methods to facilitate daily life for people with mental disorders. There are various methods for helping memory functions, but before using these methods one must establish which type of memory function is relevant to a certain situation or task (Light & Lindsay, 1990). Memory functions can be subdivided into at least three different systems:

1. Perceptional memory – how information is stored by our senses. This system is based on pure perception, has short duration and has great capacity.

2. Short-time memory, or working memory. This memory contains information which has already been re-coded or "named", and its duration is a couple of seconds. It has capacity for 3 – 7 different objects or information units. The short-time memory is fundamental for intellectual functions. It is being developed up to the age of 12.

3. Long-time memory. In this memory information is stored according to various codes. It has indefinite duration and unlimited, unknown capacity.

There are various ways to compensate for limitations of short-time memory. Light & Lindsay (1990) point to the following measures:

- repetition
- reorganization of information
- integration into bigger, more meaningful units
- automatism; the same degree of attention is not needed e.g. for dialling a well-known telephone number.
- external memory aids, e.g. pictures and still picture telephone

Recognizing is easier than remembering. This fact can be utilized in still picture telephone communication. The pictures become a means for alleviating short-type memory limitations, but they can also help long-time memory and cognitive processes because one can go back to the pictures after the call, organizing and structuring its content.

3. Purpose, Method and Procedure

3.1 Purpose

The overall purpose of this project is to find out if children, adolescents and adults with an intellectual disability can use and draw benefits from a still picture telephone in their daily lives. It is an evaluation project. A further purpose is to find out if a still picture telephone can be considered as a communication aid for persons who are mentally disabled. The concrete questions we have set up are the following:

- Can transmission of pictures via the telecommunication network facilitate communication in telephoning?
- Can the still picture telephone contribute to increased potential for social contacts, thus enhancing the individual's quality of life?
- Can the still picture telephone be considered as a communication aid for mentally disabled persons?

3.2. Outline of the Project

Earlier sub-projects within the Telematics and Disability project have primarily been directed to visually impaired and hearing-impaired persons. They have mapped requirements and described relevant areas of technology. The present sub-projects deals with children and adults with a mental disability. For evaluating and describing their possibilities to use a still picture telephone, the sub-project has been subdivided into three stages.

Stage 1.

Equipment selection
On the Swedish market today there is only one product (Panasonic still picture telephone WG-R2) which is approved for connection to the telecommunication network. This fact has eliminated the problem of selecting equipment for the various test stations. In total, 20 still picture telephones have been used in the project.

Installation
In certain cases, several still picture telephones have been installed for one and the same person, partly dependent on the contact network of the mentally disabled person. One still picture telephone has been

installed on the premises of each of the two persons responsible for the project, having contact with the stations and, among other things, carrying out interviews with some day centre personnel by means of the still picture telephone. In most cases, the equipment has been installed sufficiently early to give the personnel an opportunity to learn how it works before the mentally retarded person has been able to start training. Thus, the mentally retarded persons have not had access to the equipment or even seen it in function until the start of the project.

The equipment was delivered by a technician who also did the installation work. In conjunction with the installation, information on the purpose and objectives of the project was handed over together with a plan for its execution. (See Appendix 1a and 1b.)

Stage 2

Selection of six test stations
Some day centres had reported their interest in taking part in various project work to the Swedish Handicap Institute. Three of the still picture telephones were allotted to adult persons with mental disabilities in day centres. An important prerequisite for personnel participation in the project was a keen interest in it and a binding promise to carry the project through during a period of 18 months. Thus, continuous training and documentation was a requirement for participation. Three of the still picture telephones were deployed in homes of children. The same requirements were valid for the parents who wanted their children involved in the project. In total, the number of mentally retarded persons in the study is eight.

Stage 3

Performing the empirical study according to the method described below. *Processing of data, analysis, documentation and reporting.*

3.3. Method of Performing the Empirical Study

For performing the empirical study, interviews, diaries, reports and video recordings have been used. The steps of the project are presented below:

- Selection of persons and day centres (described under 3.3.1)
- Description of the persons in the project, summary
- Reports and diary notes
- Conversations with families and personnel
- Video observations
- Processing and analysis of data
- Written documentation

In total, five adults and three school children with mental disabilities, at six different stations, are involved in the project. All of them are moderately to mildly retarded and have speech difficulties. Three of

the stations are day centre based, and three are based in the parents' homes.

The study is mainly descriptive and accounts for both qualitative and quantitative data. It is focused on frequency, function and content according a model for communication produced by Bloom & Lahey (1978). The communicative competence and independence of the project persons will be elucidated according to Light's definition (1985).

As a basis for the work, a questionnaire (Appendix 2) has been filled out at the start of the project, giving information on all children and adults in the project. The questionnaires have been filled out by parents and day centre personnel. The answers are presented in summaries for children and adults and in person descriptions aimed at giving an overall picture of the situation facing the individuals in the project. From the person descriptions one can find out about housing situation, daily activity, function disturbances, social contact network, communication ability and telephoning ability. The person descriptions are presented for each person separately in conjunction with the accounts of the results.

The results will be presented for children and adults together from the aspects which make such a consolidating reporting possible. However, there are great differences between the telephoning possibilities of children and adults. As an example, the personnel in a day centre may consider the telephoning as an important part of the daily training, while the parents, returning home after the day's work, consider the training as something that has to be made "in addition to" all other home chores.

The parents/personnel have made diary notes (Appendix 3) giving an overall picture of the telephoning. These notes have been worked at manually. In addition, the work has been documented by means of reports (Appendix 4) which have been filled out by the parents/personnel for each call. The reports are relatively detailed. They have been processed with Statworks, a computer program.

The report shows date and time for calls and number of in- and outgoing calls. Call duration, call partner and caller are also indicated. The reason for the call and the subjects dealt with have been coded, and so have motivation and interest in using the still picture telephone. An estimation of the person's attitude to using the still picture telephone has been made. In addition, it has been noted how many pictures have been sent and what they have shown.

The report forms have been distributed to all persons active in the project. For an adult, living with his parents, staying at a day centre and having contact with a friend, thus, three different reports have been used. Therefore, certain double codings have been made. However, corrections for these double codings have been made, and each call has been counted only once. The reports have been very voluminous, and a sizeable coding work has been required for each conversation subject during the calls.

As a general rule, the work therapist in a day centre has filled out the forms, being responsible for training of the adults. Different persons have filled out the reports on different occasions. In the home situation, different persons have been active. Even here, different

persons have filled out the reports, depending on who has been present, such as a parent, brother, sister or another relative. Different persons have supplied different quantities of information, especially as answers to the open questions regarding reason for call and subjects for conversation. In certain cases this information is missing, perhaps because of an ethically based hesitation on the part of the personnel to listen to the calls. We consider it as positive that the information suppliers have been reacting in this way and avoided to provide this information. One has to accept protection of personal integrity.

In certain cases, the information on the form is incomplete or missing. Omitted data have been treated as "missing information" and excluded from the material.

The number and contents of transmitted pictures are indicated as frequencies. However, this indicates the minimum number of pictures. Sometimes, similar pictures have been sent more than once, but in the report this may have ben expressed as "pictures of Hanna and Grandma". Each category has been coded only once even if it occurs more than once. For example, if Pictograms have been used, this has been coded only once even if several pictures have been transmitted.

Thus, the contents of the Pictograms is not indicated by the coding. Sometimes it is not clearly indcated if Pictograms or other pictures have been sent. The code for Pictograms has been used only when this is clear. Sometimes, pictures showing several persons have been sent. If one of the principal persons in the call is shown in a picture, the picture content is coded as this person, otherwise as belonging to the "friend" category.

Questionnaires, diary notes and reports have been augmented with continuous notes from conversations with relatives and personnel about the functioning of the equipment, about any problems which they need help with, about the test person's interest etc. We have been keen to check this in the course of the project in order to get a reliable material. Furthermore we did not want the equipment to stand there unused. We will revert to this in conjunction with accounting for the results. The work is also documented with video observations of four of the adults. One video recording has been made at the start of the project and another one four or five months later, just before the end of the project work.

After the project, the equipment has been given to the test persons in the cases where the result has been positive. In this respect, each case has been dealt with separately, and no general decision has been made until the final results have shown to which extent the test persons have use for the still picture telephone. A letter has also been sent to all parents/personnel asking them to write down a few lines about which use the mentally retarded person, in their opinion, had had of the still picture telephone and whether or not they wanted to keep the equipment.

3.3.1. Criteria for Selection of Test Persons and Day Centres

In total, six test stations have been involved, three of them for adults and three for children. The following criteria were set up for selection of the persons to be involved in the project:

The test person are to be considered as:

- being physically able to telephone (with or without minor equipment adaptation)
- being able to speech, even if their speech does not have to be well developed
- being able to learn to telephone on their own
- being motivated for learning
- willing/needing to contact persons in the environment

Family/personnel and other persons in the environment should:

- be interested in learning how the equipment works
- be motivated and positive to teaching and training the test person to telephone
- be willing and able to spend time on training
- be willing to document the work in writing
- promise to produce reports and diary notes on a daily basis during four to five months.

Points of view on selection

Six day centres in the Stockholm area reported interest in participating in the evaluation of the still picture telephone. All of them were originally considered for participation. Based on scrutiny with respect to the criteria which have been set up, we considered that one of these centres would have difficulties to perform the project on account of its personnel situation (high personnel turnover) although they had a very interested and dedicated work therapist. In our opinion it would be hard for her to be solely responsible for all training and project work. At a later contact with this day centre it turned out that even this work therapist was about to change to another work. Therefore, this day centre was excluded. Another day centre, which was newly built, likewise showed interest in participating, but they had to abstain because their moving into the new premises was delayed. The project start was planned for mid-August, and they would not have been able to start training until November. In a third day centre having reported interest in participation, there was only one mentally retarded person who was suitable for the project. This person had a very grave motor impairment, which would have required a sizable adaptation of equipment. It also turned out that the work therapist who had shown most interest in participation had become ill and was not expected to recover for some time. Therefore we considered it as realistic to say no thanks to their offer to participate.

For different reasons, accounted for above, the following three day centres were finally selected: The Backen day centre at Sundbyberg,

the Kungsholmen day centre in Stockholm and the Draken day centre at Vaxholm. We considered these three to have good prospects for carrying through the project according to plans.

We considered the three finally selected day centres to fit well according to the criteria set up. The personnel showed great interest in participating and declared themselves willing to spend time and do work for the project. In principle it can be said that the selection of the three day centres was governed by the experiences we had had in earlier projects within the Swedish Handicap Institute, e.g. a follow-up of a project for the use of wheelchairs by adults in an institution and a project about communication training for an adult mentally retarded man who had moved from a nursing home into a group home (Brodin & Larsson, 1986). A prerequisite for an evaluation of an aid is a special interest in such questions on the part of the personnel, who must also themselves have reported an interest in participating in this type of project. After all, the selection of the three day centres as base stations has been relatively simple. In each of the Backen and Kungsholmen day centres two mentally disabled persons are involved in the project, and in the Draken day centre one person. Thus, five persons from the base stations for adults are involved.

In general, the adults have parents or personnel in their group homes as communication partners. At the Backen day centre, communication between the two mentally retarded persons in this centre occurs a natural part of daily life. The person who participates at the Draken day centre – a woman – has a third picture telephone installed, placed with a male friend in a nursing home where she had earlier been living for many years.

The communities are responsible for children's leisure centre activities up to the age of twelve. For mentally disabled children over twelve years of age, responsibility rests with the County Council. In reality this means that many children spend their afternoons alone at home because they cannot use the community child care. A still picture telephone might give such a child and its parents a feeling of security. Upon returning from school or children's leisure centre, the child can call the parents. This may make them feel secure and let the child return home alone. For this reason it was decided that school children should have priority for participation in the project.

Three school children are involved in the project, aged 6 ½, 10 and 12. The same criteria have been applied to the children as to the adults. For all the children, the family home has been selected as the base station. One family, acquainted with the project leaders, was asked if they were willing to help in the evaluation. They have a 10-year old daughter. The original idea was to have the other telephone installed in the mother's work place. However, her employer deals with delicate equipment and did not accept having a picture telephone installed in the work place. Instead, the telephone was installed in the home of one of the girl's short-time parents, with whom she stays for at least on weekend per month.

A 12-year old boy, likewise known by the project leaders, was selected for participation in the evaluation. The family home was selected as base station, and a telephone was installed there. During the autumn, he changed to a new children's leisure centre, and the

intention was to let him train walking home from the children's leisure centre to the family home on his own. A telephone was installed in the children's leisure centre. He would be able to call home from the leisure centre and say when he wanted to go home. In this way, the still picture telephone would enhance his independence. Another telephone was to be installed in the mother's work place, but the installation of a new telephone exchange there prevented this from functioning. Instead, a telephone was installed in the home of the boy's best friend, a mentally retarded girl in his own age.

The third child is a 6 ½ year-old girl beginning to go to school during the autumn. She is individually integrated into a school in the archipelago community where she lives together with her parents, brothers and sisters. It was originally intended that her communication partner would be the children's leisure centre, but because her communication ability is quite limited it was decided that the girl's grandma would be a more natural communication partner. One telephone was installed in the girl's home and the other one in her grandma's home.

3.3.2. Difficulties at the Start of the Project

The project was started at the beginning of the summer with planning, procurement and installation of equipment and selection of day centres and project participants. The holiday season caused great difficulties in contacting day centre personnel for discussing the project plans and selecting persons for participating. Therefore there is a risk that lack of time in some cases has lead us into a "wrong" choice of persons. The personnel had great difficulties in making quick decisions because the time margin was so narrow. However, they worked very unbureaucratically and skilfully, and with great efforts they succeeded to obtain decisions, thereby enabling the work to start.

There were also some technical difficulties. To start with, we had not been informed of the fact that the still picture telephone has to be connected to the last telephone outlet in the house or apartment, if there is more than one, because it would otherwise break the line to the others. This problem was solved, in some cases by getting new outlets and in some other cases by having the still picture telephone moved to another outlet than originally intended.

Another technical problem stems from the fact that Panasonic's still picture telephone cannot be connected to the digital types of telephone branch exchanges. Considering that more and more exchanges of the old analogue models are being replaced by digital exchanges, we must conclude that this is a technical shortcoming of this type of still picture telephone.

Panasonic still picture telephone WG-R2.

4. Stations and Person Descriptions

In the six test stations, the persons indicated below are involved. To the right it is indicated how many different contacts the person in question can call. This shows that 14 persons can be contacted outside the six stations. In total, eight persons with a mental disability are involved in the project. In each of two day centres, two mentally retarded persons participate. In addition, two of the outside parties are mentally disabled.

STATION 1
Kungsholmen day centre, Stockholm

A. Man, 22	1
B. Woman, 34	1

STATION 2
Draken day centre, Vaxholm

C. Woman, 38	2

STATION 3
Backen day centre, Sundbyberg

D. Man, 30	2
E. Woman, 30	3

STATION 4
School child. Home

F. Boy, 12	3

STATION 5
School child. Home

G. Girl, 10	1

STATION 6
School child. Home

H. Girl, 6 ½	1

The figure below shows the six test stations.

BASE STATION
Stenhamra - Jönköping

Test station 1 Kungsholmen DC		Test station 2 Draken DC	Test station 3 Backen DC		Test station 4 School child, 12	Test station 5 School child, 10	Test station 6 School child, 6
A	B	C	D	E	F	G	H
Parents' home	Group home	Group home	Group home	Parents' home	Children's leisure centre	Short-time parent	Grandma
		Friend	Parents	Own home	Friend		Friend

Figure 1. Model of the six test stations.

The figure shows that eight mentally retarded persons (A-H) are involved in the project. The two persons in the Backen day centre (D and E) have contact also with one another. The names of the participants are faked in the report.

5. Summary of Project Participants

Five adults – two men and three women – are involved in the project. They are between 22 and 38 years old. The children – two girls and one boy – are between 6 ½ and 12 years old.

All the children live in their parents' homes. For one of them, this is a foster home since the age of 6 months, the same home all the time. Two of the adults have spent most of their lives in nursing homes. Three have grown up in their parents' homes. Two of them have moved to nursing homes at the age of 12 and 14 years, respectively. Today, one of them still lives at home, while three persons have group homes and one spends half of the time in the home and the other half in a group home (since November 1990).

School attendance has varied. According to information from personnel, three adults probably have not gone to school at all or have done it only to a limited extent. Two of the children go to special school for mentally retarded children and one in nine-year compulsory school.

One of the adults is mildly retarded, while the others are moderately retarded. All the children are moderately retarded. Additional disabilities are shown in the table below.

Table 1. Main additional disabilities in the eight test persons

Functional disorders	Adults	Children
Visual impairment	4	2
Has been given spectacles	4	2
Uses spectacles daily	4	2
Needs magnified text	1	–
Hearing impairment	–	1
Has been given hearing aid	–	1
Uses hearing aid	–	1
Motor impairment	1	1
Uses aid for moving around	1	1 (sometimes)
Speech difficulties	5	3
Medical disabilities	3	1
Coarse motor difficulties	1	1
Fine motor difficulties	4	1
	5	3

The table shows that all the test persons have speech difficulties. Some of them also have additional disabilities such as a visual impairment, medical disabilities (e.g. diabetes, incontinence, insufficiency of the thyroid gland), inability to move around and fine and coarse motor difficulties. The ability to use the picture telephone may in some cases be affected by motor difficulties, making it necessary to consider adaptation already at the outset. Even the visual impairment in six of the eight persons may affect the ability to use the still picture telephone. Its monitor is relatively small, and the picture quality is not very high. This need not cause any difficulties, but we have tried to be attentive to this problem already at the outset.

The ability to recognize pictures and symbols varies between adults and children in the way shown by Table 2.

Table 2. Ability to recognize pictures and symbols

Pictures	Adults	Children
Recognize objects in pictures	5	3
Recognize persons in pictures	5	3
Recognize symbols in pictures (Bliss, Pictogram etc)	3	1
Recognize digits and letters	2	3
Recognize persons in photos	5	3
Use symbols for communication	4	–
Use pictures to mark objects in the near environment	2	–

The table shows a certain difference between adults and children in terms of ability to recognize pictures and symbols. The children, who are all going to school, seem to have a better ability to recognize objects and persons in photographs as well as pictures, digits and letters than adults. On the other hand, the children in this project have not been using any symbol language. Therefore, they do not recognize such symbols. Four of the adults use symbols for communication.

According to parents and personnel, all the adults and children are motivated for communication, and all the children together with three of the adults use the spoken language. However, a common feature of all the eight participants is that the spoken language is not well developed. Most of them do not use speech as their only way of communication. Instead, they often use it in combination with other types of communication. Three of the adults and two of the children use sign communication for supporting the speech. All of them also use body language or gestures. All the participants initiate communication, always or often. Only one person – a child – takes few initiatives. When it comes to responding to communication, the picture is positive both for children and adults. Four of the adults use communication aids, generally in the form of communication boards. None of the children use communication aids.

At the start of the project, we asked how often the project participants were using the telephone. Only one of the eight persons

was using the telephone daily, two of them sometimes and five of them seldom. In this respect, there was no difference between children and adults. We also wanted to know if the project participants could recognize the voices of their folks in the telephone. This question was important because their ability to telephone is connected with their ability to understand with whom their are talking and why. The following table shows the recognition ability.

Table 3. Telephoning ability

Ability	Adults	Children
Recognize the voices of their folks in the telephone	4	2
Can distinguish between different telephone signals	3	1
Can dial a telephone call	2	–
Can answer the telephone	5	3

All the test persons – both children and adults – can answer the telephone. Only two adults can initiate a call without help. The others need help from somebody dialling the number. It is highly probable that this keeps these persons from taking own initiatives. On the other hand, nearly all of the participants have difficulties in terminating a telephone call. Most of them just let the receiver hang because they do not understand what they are supposed to do. Likewise, they do not know what to say in order to end the call. Obviously, training of various parts of the telephoning procedure is necessary.

An essential question in connection with telephoning deals with the social networks of the project participants. What are their needs to telephone, and which persons is it important to communicate with?

When it comes to the social network, the difference between children and adults is great. All the children have daily contact with their parents, brothers and sisters. Every week they have contact with other relatives, generally grandparents and cousins, and they have sporadic contacts with other relatives. They also have contacts with friends and neighbours. This is not surprising because the children live with their families and take part in their normal social life.

For the adults, the picture is different. Only two have daily contact with their parents, and only one has contact with brothers and sisters every week. The others have sporadic contacts with parents, brothers and sisters, and one of the adults has never had any contact with parents, brothers or sisters. Two of the adults have sporadic contacts with relatives and friends while two have no such contacts. The adults who have daily contact with their parents have also contact with relatives.

For the three persons who have never or seldom contact with their parents, the social network is generally limited to personnel, people who live in the same group home, or friends from the day centre. They seem to be "isolated" from others and lonely. Presumably, a still picture telephone would give these persons a possibility to

maintain a contact. Many of the adults have been living in nursing homes for the greater parts of their lives, and the contact with their folks has been broken. One example is the woman who has been living in a nursing home where she has had contact with a male friend of the same age. In spite of the fact that he has difficulties to understand and make himself understood, the woman has been calling her friend in the nursing home every two weeks since she herself moved away from this home. It has been very interesting to see how these two people have reacted to the still picture telephone. We will revert to this in reporting the results.

6. Person Descriptions and Results

Descriptions of the eight project participants follow below. For each person, background information from the questionnaire is presented, followed by the results of the investigation. The results contain quantitative data in the form of frequencies from the reports and qualitative data from diary notes and certain of the report questions. The results for the adults are presented before the results for the children. The chapter is followed by summaries of the results for adults and children.

6.1. Description of Anders (Station 1)

Anders is 22 years old and lives together with his parents. He is the only child in the family, and he has always been living with his parents. Anders has spent 10 years in a special class for motor impaired children and 4 years in special vocational school for mentally retarded children.

His day starts already at 06.45. He takes his breakfast, makes his morning toilet and goes to the day centre, where he stays until 15.30. His main occupation in the day centre is to work with computers. Upon returning from the day centre, he eats some sandwiches with a soft drink. Afterwards he listens to sports and news programs in the radio. He watches the TV news at 18.00, eats his supper and watches TV until 20.00. After that, he prepares himself for the night and takes out the clothes he is going to wear during the next day. He makes notes in his diary and sometimes listens to another sports program in the radio until 21.00, when he goes to bed unless there is some more sports program on TV to watch. His spare time interests are judo, horse riding, dancing, sports and travelling.

Social contact network

Anders has daily contact with his parents and sporadic contacts with other relatives. Every week he meets friends or personnel from the day centre in his spare time. Anders has no contact person.

Functional disorders

Anders has a mild mental retardation. His status has been assessed by a psychologist within the service system for mentally retarded persons. He has a visual impairment and uses spectacles daily. Due to CP he has difficulties with gait and balance. Furthermore he has motor

difficulties with his hands and arms. Sometimes Anders uses a wheelchair to move around. He has difficulties with speech and communication.

Pictures/Communication/Language
Anders recognizes objects and persons in pictures and photos. He also recognizes symbols, digits and letters. He normally uses pictures/symbols in his communication.

Anders is motivated for communication, but he does not communicate by speech. He is interested in communicating and initiates communication. He also always responds to communication. Primarily he uses sign communication, but in parallel with this he uses Blissymbols. He can pronounce and write certain supporting words. Anders has a "Bliss-talk" (a speaking Blissymbol board) and an "Ove"[1] speech syntheziser connected to his computer.

Telephoning
Anders seldom uses the telephone. When he wants to make a call it is to his father, his grandmother, "Parliament Today" and the program service of the "Globen" indoor arena. He recognizes voices of his folks on the telephone. He can also distinguish between different telephone signals and knows what they mean. He can initiate a call himself, and he also answers by himself. Normally, his procedure for telephoning starts by his calling his father at the work place and asking for "Andersson" (the father's surname). In the course of the conversation, his father puts questions to be answered by the son. Anders has a loudspeaking telephone, which makes it easier for people in his environment to help him if he does not understand what is said.

6.1.1. Anders' Use of the Still Picture Telephone

Anders has been using the picture telephone for approximately three months. The personnel informs us that Anders has made 24 calls from the day centre and received 2 calls. His father informs us that he has received 31 calls from Anders and made 2 calls himself. The reason for the discrepancy is illness on the part of the work therapist who has been responsible for the reports. This has caused the omission of report notes in the day centre on some occasions. In addition, Anders has sometimes made a call himself without the personnel noticing it.

Anders' conversation partner has mostly been his father. He has also been calling his mother and speaking to the personnel. In most cases he has initiated the conversations himself. On a few occasions, the personnel has taken the initiative instead. The average duration of the calls has been around five minutes, and the longest call has lasted for 12 minutes. In most cases, the reason for calling has been a desire for small talk and exercising the telephoning procedure. Both the day centre personnel and the father have informed us that Anders has been interested or very interested in calling. On one occasion only, he was disturbed by the situation and was unwilling to cooperate.

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[1] Ove is an experimental Swedish speech syntheziser.

In Table 4, three conversation subjects are indicated (1, 2, and 3). The numbers indicate the sequence in which various topics were introduced in the course of the conversation. As shown in the table, there have been only two subjects during the conversation in most cases.

Table 4. Conversational subjects – reports from the father

Conversational subject No.:	1	2	3	Total
Activity during the day	17	1	2	20
Greeting phrases	4	2	3	9
Meals, food	1	1		2
Families and friends		2		2
Future activities	2	4		6
The telephone call		3		3
Show something	3			3
Information missing	6	20	28	54

The table accounts for the father's notes about subjects. These notes have been used because they are first-hand information. In the reports produced by the personnel some calls are missing, making some of their notes differ somewhat from the father's notes. In general Anders talks about daily activities. Primarily the conversation is about computers, which he is at present working with in the day centre. As the table shows, the father has often indicated just one or two conversational subjects. Greetings and future activities are recurring subjects.

On the average, Anders has sent and received at least five pictures per call. Anders often starts the communication by sending a picture of himself, and sometimes the other party (his father) has returned a picture of himself. Anders has also sent pictures of persons belonging to the personnel. Pictograms, signs, photos, video pictures and data pictures have also occurred. Pictures of objects occur relatively often. So do letters and text.

According to personnel estimates of Anders' attitude to telephoning, Anders enjoys the conversation and finds it interesting and exciting. On a few occasions, Anders has found the situation demanding and difficult.

The diary notes show that Anders has already in two weeks learned to use the telephone entirely by himself. He likes to go to the telephone and make a call, and in most cases the initiative is his own. He prefers to have someone else present, because his father sometimes asks questions which he finds difficult to answer by means of pictures, signs or his limited speaking ability. In face-to-face conversations – without telephone – Anders often uses sign language, signing relatively fast, but in a picture telephone conversation he must show one sign at a time and take care to make it well visible on the

monitor. Therefore, the use of signs in still picture telephone conversation has been limited.

The encouragement and involvement of Anders' parents is very important to him. His father goes home for lunch every day in order to be able to receive a call from his son. Anders knows that it is his responsibility to call, and he becomes very sad when his father's working situation prevents Anders from reaching him. During certain weeks, it has been difficult for his father to go home and receive calls. In these weeks Anders has not made as many calls as he generally does. During some other weeks Anders himself has been occupied by various activities outside the day centre, preventing him from calling. However, after one month he is still very interested in still picture telephoning and enjoys calling. For a couple of weeks Anders has been unable to use the picture telephone because he has been abroad for holidays.

During the last few weeks of picture telephone use, the father pointed out that a pedal switch for freezing the picture would be fine. Anders needs both hands for signing and cannot easily handle the pushbuttons on the picture telephone with his hands at the same time. His father has also suggested a holder in front of the picture telephone for paper slips with text and for Pictograms. In conclusion, Anders' father expressed a wish to keep the picture telephone. He also wished that Anders could have an opportunity to call some other persons than the parents, e.g. a friend. Obviously this requires at least one picture telephone more.

At the conclusion of the project, the personnel reported that Anders is still very interested in his picture telephone. He uses it almost entirely by himself, and sometimes he makes a call without telling the personnel. In most cases he keeps track of the times when he can reach his father.

During the autumn, the work therapist has been ill rather often. During these periods, the personnel have sometimes forgotten to fill out the reports. The work therapist, too, concludes her reporting by saying that Anders enjoys the still picture telephone very much, and she recommends that he should be allowed to keep it. She also says that Anders has found it enjoyable and interesting to participate in the project. However, there have been some difficulties on account of his motor impairment. In her opinion Anders has great use for a still picture telephone in a future own home. Certain adaptations are needed for enabling him to use both hands for signing. The still picture telephone will bring a feeling of added security into the everyday life of both Anders and his parents.

6.2. Description of Britta (Station 1)

Britta is a woman of 34. She has been living in a big nursing home near Stockholm, but she has spent the last few years in a group home. The personnel does not know if she has had any opportunity to go to school.

Britta's day starts with her morning routines and going to the day centre using the community's transportation service for disabled persons. In the day centre she works until 15.30 with colour and

form, "Friskis och Svettis" (a system for physical exercise) and music. The evenings are used for household chores, walks and some other activities. Her spare-time interests are dancing, kitchen chores and walks.

Social contact network
Britta has sporadic contact with her parents and her three brothers and sisters. In the summer she has only contact with her "summer ma". Britta has a contact person.

Functional disorders
According to the personnel, the degree of retardment has not been assessed. Britta has speech difficulties and also difficulties with eye-hand coordination. She is visually impaired and uses spectacles daily.

Pictures/Communication/Language
Britta recognizes objects and persons in pictures and photos, but she does not recognize digits, letters or other symbols. She cannot read.

Britta is motivated for communication and uses speech to a limited extent. She often initiates communication and responds to communication. She also uses sign communication a little. Her main way of communication, therefore, can be said to be isolated words, a few signs and communication via her "contact book". In this book she – together with the personnel – pastes up pictures of what she has made and done in the day centre, and when she comes home to the personnel in her group home, they look in the book and speak about its contents. With her body language, Britta clearly indicates what she wants. Thus, the only communication aid she uses is the contact book.

Telephoning
Britta sometimes uses the telephone to call her contact person, to make a call from the group home to the day centre, or vice versa. She cannot initiate a telephone call on her own, but she can answer the telephone. The personnel is not sure whether or not she recognizes the voices of her folks in the telephone. She cannot distinguish between different telephone signals. Telephone calls are always made on the initiative of the personnel. When she is to make a telephone call, they always prepare for the call and dial the number together.

6.2.1. Britta's Use of the Still Picture Telephone

Britta has had access to the picture telephone for about three months. The day centre personnel states that she has made seven calls from the day centre and received three. She has taken part in five calls from her home. The average call duration has been about 8 minutes, and the longest call has lasted for 13 minutes. The purpose of the calls has been small talk, getting a confirmation of something, or training in telephoning. In half of the conversations, Britta has been interested in calling. She has shown her interest by being happy and active. She has not been telephoning on her own. In the remaining cases she has either been uninterested or become interested in the course of the conversation.

Table 5. Conversational subjects – reports from DC

(DC = Day Centre)

Conversational subject No.:	1	2	3	Total
Activity during the day	5	1		6
Relatives and friends			1	1
Future activities	1	3		4
The telephone call	2			2
Earlier activities		1	1	2
Show something	1	1	1	3
Information missing	1	4	7	12

The notes made by the day centre personnel about conversational subjects are summarized in Table 5. The table shows that most of the calls deal with daily activities. According to the personnel in the group home, the calls have also been dealing with the telephoning as such.

On the average, Britta has sent or received at least 4 pictures during each call. The pictures have been showing herself, the personnel, and objects. According to the personnel's estimate of her attitude to telephoning, Britta has on many occasions been anxious and insecure, finding the telephone conversation difficult.

The diary notes show that Britta's interest in still picture telephoning declined very fast. Already after four weeks the work therapist reported that Britta did not want to call. The work therapist indicated the following possible reasons why Britta did not want to use the telephone:

- Her mental retardation. Even if Britta hears the voice and seems to recognize the picture, she seems confused when she is calling. On a couple of occasions nobody was home when she called, and she just heard a telephone answering device, which confused her.

- Her visual impairment. Britta has difficulties in seeing small objects. Perhaps she found the monitor picture too small or too unclear (although the resolution was good). A bigger picture would possibly have given better results.

- Fading charm of novelty. In the beginning, Britta found the use of the picture telephone interesting, but even then, she had to be motivated and encouraged to call. When the conversation had started and she could see the picture, she enjoyed it, but after some time her interest declined.

According to the work therapist, it is probably a combination of these three factors that has caused Britta not to use the picture telephone much.

The group home personnel reported that Britta had initially a positive attitude to the use of the picture telephone. Only once, however, she herself took the initiative when she was in the group home. In a later phase, Britta firmly denied to use the telephone.

In conversations between the project leaders and the day centre work therapist in the beginning of October, when Britta had had the telephone for a little less than a month, it turned out that Britta had shown great aversion to using the telephone. She was no longer interested or motivated to call. She would rather find the telephone to be something negative. It was therefore agreed – via telephone – that the day centre and the group home should terminate the trial. It was no longer possible to motivate or persuade Britta to continue her training. Thus, the trial was terminated after five weeks.

However, the day centre personnel asked for permission to let the still picture telephone be used by another person who had shown a great spontaneous interest in it in the day centre. At this time, the project leaders considered Britta's participation in the project as finished, but we let the picture telephone remain in the day centre. However, because the work therapist was ill during the autumn, no new test person could become involved in the project.

Britta used the still picture telephone only a few times during the period from October till December. She never took any own initiative to calling, but she answered the telephone if somebody else called. However, a good deal of motivation work was often required for her to answer the telephone. According to the work therapist's judgment, Britta cannot cope with the still picture telephone and should no longer have it after the termination of the project. This is also the opinion of the project leaders and the group home personnel. After the termination of the project, therefore, this telephone is given to Anders, whose parents have wanted to keep the telephone because Anders needs it for conversation with his friends.

6.3. Description of Carina (Station 2)

Carina is a woman of 38 who has been living in a nursing home most of her life. In April 1989 she moved into a group home together with three other women and men.

Carina starts her day already at 06.00. She takes a shower and dresses on her own. Together with someone of the group home personnel she then walks to the day centre, where the day begins with a morning meeting for planning of the day's work. Her own work starts at 09.15 by delivering laundry and fetching used laundry in a hairdresser's saloon. She then returns to the day centre and does the washing. During the rest of the morning she carries out various activities such as cooking, carpentry and house cleaning. After lunch she takes a walk before returning to the day's work. She irons the laundry, helps a little with various chores, and returns home. Upon returning home she rests for a while, plays some music or listens to the radio. After supper she usually takes part in some spare-time activities, watches TV, or knits. She goes to bed already around 9 and usually sleeps during the whole night.

The day centre personnel says that the journals contain no indication of Carina having gone to school. Her main task in the day centre consists of washing and ironing towels and delivering the laundry. For one day a week, Carina also takes part in external activities, handling environment care in a sports establishment at Vaxholm.

Carina's spare-time interests are dancing, cooking, cinema and tours. She looks into newspapers and weekly magazines (she cannot read), watches TV and listens to radio or a tape recorder.

Social contact network

Carina's contact network is very limited. Besides the personnel of the group home and the day centre she has few social contacts. Carina never has contact with her parents, brothers, sisters or relatives. The only outside persons she has contact with are a trustee, a male friend in the Åkersberga nursing home and the three persons who share the group home with her. She has no contact person.

Functional disorders

Since a few years ago, Carina has been considered as being on the B level, i.e. moderately retarded. This assessment was made by a psychologist in the Åkersberga nursing home, where she spent most of her life before moving to the group home.

She has no functional disorders in vision or hearing, but she has a motor impairment. Her gait and tempo are hampered by a troublesome scoliosis and a strong lowering of the arches of her feet. She also has speech difficulties and reduced function of the thyroid gland. She suffers from night-time incontinency. She has no coarse motor difficulties, but she has some fine motor trouble. Sometimes she is a little clumsy.

Pictures/Communication/Language

Carina recognizes objects and persons in pictures and photos, but she does not recognize digits, letters or symbols. In the day centre they use pictures/symbols for communication, and she recognizes the symbols which are used in connection with the activities.

Carina is motivated for communication and uses her speech. She always initiates communication, and she always responds. She does not use sign communication or pictures/symbols for communication. Therefore, her main way of communication can be said to be speech in combination with body language. She touches people in order to show what she wants. She uses no communication aids.

Telephoning

Carina seldom uses the telephone. When she calls, the other party is either the day centre or her friend in the Åkersberga nursing home. Till now, she has been calling her friend every two weeks. She recognizes voices of friends and relatives in the telephone, and she can answer the telephone, but she cannot establish a call herself. She needs practical assistance for calling. Carina herself takes initiatives and informs the personnel when she wants to make a call. Then someone of the personnel dials the number for her and leaves her.

6.3.1. Carina's Use of the Still Picture Telephone

Carina has been using the picture telephone for about three and a half month. The day centre personnel states that she has made 36 calls. From the group home she has made 22 calls. In total, Carina has made 58 calls. The other party has in general been personnel in the day centre or her group home. She has also been calling a mentally retarded male friend living in a nursing home. This man, too, has had a still picture telephone.

The average call duration has been 12 minutes, and the longest call lasted for 25 minutes. The initiative has been taken by the personnel in the cases where they have been the other party. Carina herself has taken initiative to calling her friend. The purpose of the calls has been to train her telephoning and try the still picture telephone plus doing some small talk and delivering various messages.

According to the judgment of the day centre personnel, Carina's interest in using the still picture telephone has been great or very great. She has demonstrated her interest by active participation and by showing her joy. In estimating her attitude to telephoning, the personnel says that she enjoys it and finds it exciting and interesting. On some occasions, however, she has found it difficult and shown some insecurity.

Table 6. Conversational subjects – reports from DC

Conversational subject No.:	1	2	3	Total
Activity during the day	25	6	2	33
Greeting phrases	9			9
Future activities	1	12	4	17
The telephone call		1		1
Earlier activities	1		1	2
Show something			1	1
Information missing		17	28	45

Most of the calls have been dealing with daily and future activities. The figure for "Information missing" is extremely high. There is a natural explanation for this. Carina has clearly shown that she does not want anybody to listen to her calls, neither calls to personnel nor calls to her male friend. Considering her personal integrity it has been reasonable for the personnel to respect her wish in this regard. Probably the personnel has been present only for a short while in the beginning of each call.

Carina has sent and received relatively few pictures. On the average, at least 2 pictures per call have been transmitted. The subjects have been pictures of herself, the personnel, her friend, some objects, and the room.

The diary notes show that Carina was initially curious and soon learned how to operate the still picture telephone. The first time she came into contact with the still pictures telephone in the day centre, her immediate reaction was that she wanted to have one at home too.

The following account of Carina's behaviour when the picture telephone was new is quoted directly from the diary notes:

> "Carina immediately switches on the monitor. Looks – sees me too – looks again. 'Can take home soon' she says, and strokes it a little before she turns it off and walks away. Half an hour later – Carina has switched on the monitor while she is vacuum-cleaning – looks at herself now and then and laughs when Kristina (friend) is also shown there. The monitor remains on while she continues the vacuum cleaning. When she has finished she asks if the monitor should remain on. 'Can you turn it off?' Then she turns it off and walks away with the vacuum cleaner. Kristina comes in and wants to look once more. 'You *must not*!', says Carina. 'It is expensive.' Then she puts it on as she dusts it. She accidentally turns it upside down, and Kristina turns it right. Carina tells Kristina 'Don't!'."

The quoted passage shows that Carina was aware that the still picture telephone was hers, that it was valuable and that she had to be careful with it. She takes care of it as a precious asset.

After a few weeks of using the still picture telephone, Carina expressed a wish to call her male friend Pelle in order to inform him about the picture telephone. Unfortunately, Pelle had no picture telephone connected. Thus he could not send pictures to Carina. This was hard for her to understand.

During the first part of the project period, Carina could not dial the other party's number or otherwise use the picture telephone on her own. But she could terminate a call. Her problem in dialling may be due to fine motor disturbances. The personnel suggested marking the function buttons "freeze/monitor" and "send" on the picture telephone with symbols in order to make it easier for Carina to distinguish between them and improve her use of the various functions.

During certain weeks, only few calls have been made. This is because persons belonging to the day centre personnel have been ill/absent. Every Tuesday all personnel works outside the day centre. Therefore there have been no calls during Tuesdays. Carina also has sometimes been sick or in a bad mode, unwilling to call.

The day centre work therapist states as her impression that the group home personnel was not sufficiently informed about what was to be done within the project. They were not sure of their role in the project, e.g. if they, too, should encourage Carina to call. Therefore, the work therapist contacted the group home personnel to discuss a cooperation and talk about the symbols to be used for adaptation of the monitor. After this discussion, in the opinion of the work therapist, the group home personnel did not initiate the use of the telephone often enough, and they were not sure in which way they were to participate. In addition, the work therapist says that she herself was not quite sure of who should guide and encourage them. One effect of the meeting was a decision to mark the freeze/monitor button with a picture of a cat and the send button with a bird, to which Carina has a positive attitude. In conjunction with the discus-

sion above, it was decided that Carina's friend should also have a still picture telephone.

The work therapist has the main responsibility for Carina's training and sometimes finds it difficult to reach the goal, which is that Carina should make 10 calls a week. This is partly because there are many days when Carina and the work therapist do not meet at all and partly because of practical problems, such as the fact that Carina's male friend did not get his picture telephone installed as fast as intended. Another comment from the work therapist is that Carina, although she has a positive attitude to the picture telephone and likes to use it, does not often take the initiative herself.

After a little more than a month, Carina's male friend had a picture telephone installed. Carina was there, and she was very happy that Pelle also was going to have a picture telephone. She showed great joy over being able to talk to Pelle over the picture telephone. At about the same time, the adaptation with the cat and bird symbols on the three monitors (day centre, group home, nursing home) was ready.

Some time after the mounting of these symbols on the monitors, the work therapist told us that Carina was losing her overview of the functions of the buttons with the symbols and especially the cat button. Carina manages to produce a still picture but not to make it move again, as it does before it is frozen. As a result, Carina sometimes presses all the buttons at random, making the outcome a matter of hazard. Carina still has problems in selecting the right function button. The work therapist states that Carina still needs much help with calling but that she has a very positive attitude and enjoys it.

The personnel has found that they have been able to make the conversation more concrete by means of pictures in cases where Carina goes home (sneaks away) from her work/day centre during the day and is unwilling to return. They have then observed that she can manage a telephone call better if it deals with a somewhat inflamed subject (the fact that she has gone home). Sometimes she has actually changed her mind and returned.

After nine weeks of using the picture telephone, Carina still has a very positive attitude to it. One day she came to the day centre and, radiant with joy, told that she had been speaking to Pelle over the picture telephone. She has now became more active in her telephoning and calls more often than earlier, even if she is not independent in the picture transmission. One of the problems with the still picture telephone has been to hold the receiver and transmit a picture at the same time. Therefore, she has had a loudspeaking telephone installed.

The work therapist's final notes show that the still picture telephone has increased Carina's joy, lust and initiative in telephoning. The quality of the conversation has improved, and it has become easier to carry out a constructive conversation with the support of the pictures. Carina now calls more often than earlier, and it has been easier to motivate her for calling and reporting in case of absence, e.g. because of illness or when she has left the day centre before the end of the working hours because of a conflict.

The work therapist has found some difficulties in being responsible for observations, diary notes and any extra adaptations and accessories

because she is working in the day centre while Carina's natural conversational situation has been in the group home. She has a feeling that the conversations in the day centre have been initiated only for observation and training, not caused by Carina's own motivation and needs.

The work therapist sees development possibilities with respect to the still picture telephone. It can be a means for encouraging communication and social relations. For example, Carina has not been using any alternative way of communication, but now they are planning to start with Pictograms, which can be transmitted via the telecommunication network.

6.4. Description of Daniel (Station 3)

Daniel, who is 30 years old, was living with his parents until he was 12. Then he moved to a home for mentally retarded children. After a year he moved to a nursing home and after another year to a second nursing home. He lived there for eight years until he moved to a group home at the age of 22. Today Daniel lives in a group with four other adults. He spends his spare time watching TV, listening to music, bowling, cooking, taking photographs, meeting people and going dancing.

Daniel's day starts by being waked up early in the morning by the night personnel. He takes care of his morning chores and has breakfast. A nurse from the nursing centre comes to give him a shot of insulin. Then he goes to the day centre by bus. The work starts with the group gathering and having morning coffee. After coffee they start working with stamp-printing on fabric which will be used as material for tablecloths and pillowcases. They have lunch in the day centre or in a restaurant. After lunch they are together for a while before they resume working. In the afternoon Daniel usually works with his diary together with someone from the personnel. Using Pictograms he writes about the day's events, what he has had for lunch etc. Daniel also takes care of the plants in the day centre. Celebrations of anniversaries with singing and speeches is also managed by Daniel. Once a week he takes part in a music circle. Before returning from his work, Daniel sometimes takes a walk.

At home he willingly helps to cook and set the table, and in the evenings he goes to see friends. Once a week he goes bowling. He drinks evening coffee, takes a shower and prepares himself for the night already around 20.00, but after that, he likes to stay up watching TV. He likes to be the last one to go to bed.

Daniel has spent four school years in a special class for children with a mental retardation, one year in a school for children with a severe mental retardation, and eight years in vocational training.

Social contact network

Daniel's contact network is made up of sporadic contacts with his mother and father. He has a sister and a distant cousin with whom he has very sporadic contacts. He has daily contacts with friends in the group home and with his contact person, who works at the day centre.

Every week he has also contact with friends from other group homes, with day centre personnel and with day centre friends. He has also sporadic contacts with some friends who live by themselves.

Functional disorders
At birth it was found that Daniel has Down's syndrome. The personnel considers him to be moderately retarded. They point out that he has been assessed and diagnosed by a doctor and a psychologist within the service system for mentally retarded persons in 1964 and 1969, at the age of 6 and 9, respectively. Daniel has a visual impairment, reduced hearing perception, speech difficulties, diabetes and food allergy. He uses spectacles. His coarse motor ability is good, but he has difficulties with fine motor coordination. He has a certain degree of insecurity, of exaggerated caution in his movements.

Pictures/communication/language
Daniel recognizes objects and persons in pictures and photos. He recognizes Pictograms, and symbols are used for communication or for marking objects and places in his near environment. He cannot read digits or letters, but he recognizes the letter group forming his name.

Daniel is motivated for communication and uses speech. He often initiates communication, and he always responds. He supports his speech with both signing and pictures/symbols. He uses Pictograms, Bildtolk[1)], photos, name stamp and colours as communication aids.

Telephoning
In telephoning, he seldom takes initiatives. Sometimes the personnel tries to encourage him to taking a telephone contact. Then he calls a female friend living by herself, a female friend from the day centre, buddies in other group homes, group home personnel or his parents. He recognizes voices of persons he knows when he hears them in the telephone, and he can distinguish between different telephone signals. He willingly answers the telephone, and he can relay a message, reporting who is being called. If he does not know, he goes for help. But he cannot initiate a call himself.

In telephoning, according to the day centre personnel, someone helps him to dial, but when this has been done, Daniel copes with the telephone himself. He knows the procedure for telephoning and can also carry out an everyday conversation in his way, i.e. with a mixture of pictures and speech, even if he does not understand all that is said and cannot himself say all he wants to say. He does not understand that one has to terminate a call.

6.4.1. Daniel's Use of the Still Picture Telephone

Daniel has been using the still picture telephone for about three and a half month. He has been using it in the day centre and at home. In total, Daniel has taken part in 145 calls. The day centre personnel

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[1] The Swedish name Bildtolk literally means picture interpreter.

reports that he has had 106 calls. 69 of them have been outgoing calls, to group home personnel and to a female friend. In most cases Daniel has taken the initiative himself. The day centre personnel has also taken initiative to some calls. Daniel has also been calling his parents, but they have not had any still picture telephone. They have thus answered using an ordinary telephone. There have been 37 incoming calls, most of them from group home personnel and from a female friend. From the group home, Daniel has participated in 39 calls, 35 of which have been incoming calls. Most of the calls are from the female friend. Also most of the outgoing calls have been for the female friend.

The average duration of the calls in the day centre has been 10 minutes, and the longest one lasted for 20 minutes. From home, the call duration has been the same. The purpose of the calls has generally been to exchange small talk both from the day centre and the home. Other purposes have been to train telephoning, test the telephone and ask how the other party is.

Daniel's interest in using the still picture telephone has been very great. He has shown this by engaging actively in the calls and expressing joy. According to estimates by the personnel, Daniel has found telephoning to be positive in more than 90 % of the cases both in the day centre and at home.

Table 7. Conversational subjects – reports from DC

Conversational subject No.:	1	2	3	Total
Activity during the day	39	19	8	66
Greeting phrases	13	6	4	23
Weather	3		2	5
Meals	21	18	4	43
Nearby persons	1	1	2	4
Future activities	12	29	22	63
The telephone call	3	1	1	5
Earlier activities	6	12	6	24
Feelings	3	3	2	8
Show something		1		1
Information missing	5	17	55	77

Many calls have been dealing with activities during the day, future activities and earlier activities. Meals also have a central place among the subjects. On a relatively large proportion of the calls, information is missing, especially about subjects which are brought up during a late stage in the conversation. Considering the fact that Daniel often speaks with his female friend, it is natural that the personnel has not been listening for more than a short while in the beginning of the call.

Daniel has sent or received at least 5 pictures per call. He mostly sends pictures of himself, and in conversations with personnel they have sent pictures of themselves to Daniel. Daniel's female friend also has sent pictures of herself. Pictograms have been sent to a great extent. Pictures of objects have also occurred, like farewell gestures.

The diary notes show that the first time Daniel used the telephone was at home together with personnel from the group home and the day centre. He was then happy and positive. He talked with the day centre personnel and pressed the buttons very cautiously. The personnel helped him to a great extent. Pictures of Daniel and the day centre personnel were transmitted on this occasion. When he saw himself in the TV monitor he guessed that it showed some other person, but when he saw himself the third time his guess was right.

Daniel's first own telephone call was made from his home and went to his female friend. He had difficulties in seeing the push-buttons on the monitor because they are recessed and have the same colour as the rest of the apparatus. He did not quite understand that the picture on the monitor really showed the female friend he was talking to. He did not understand whom the picture showed until his third guess. All the time he needed instructions for handling the still picture telephone.

A week or so later he had learned to understand who was shown in the picture if the other party explained what was going to be shown. Even if he did not understand that he sent pictures himself, he found it very amusing, and he was curious about the received pictures.

By and by, Daniel learned to hold up pictures in front of the monitor, even if he found it difficult to hold up the picture and at the same time check its position on the screen. He tried to send both Pictograms and photos. The practical handling of the apparatus is difficult for Daniel. The simultaneous operations of holding the receiver, holding a picture, talking into the microphone and pressing the buttons are a little too much for him. He wants to cope with it himself, and he gets angry when he cannot do it. According to the personnel, a loudspeaking telephone would eliminate some of these problems.

Daniel likes to use the telephone. He tells when he wants to call and whom he wants to call, but the personnel must point out the buttons to press and even help him to press them and hold the picture to be sent. The personnel also discovered that Daniel did not terminate the calls. He was a bit surprised when the call "vanished", and he held the receiver for a while more.

After about a month Daniel knows how to handle the still picture telephone. He has been using the telephone almost every day and quickly learnt how to call and how to send pictures. However, he does not quite understand how the telephone works. He likes it all much, and he is active in sending pictures. The personnel points out that the picture quality is bad, especially when pictures are saved in the memory. They also think it is a pity that one cannot talk while the picture is being transmitted. Daniel has problems finding the right buttons on the telephone. It is also a bit hard for him to understand that only very few of the telephone owners can see him and the pictures in the monitor. For example, he tried to call his mother and wanted to see a picture of her, and he was disappointed when this did not work. During most calls he takes the receiver and tells the other party to switch on the TV (the monitor).

Once Daniel was ill for a week and missed a party at the day centre. On this occasion they used the still picture telephone to give Daniel an idea of the party atmosphere. At least ten persons were talking with Daniel. In this way he could both see and listen to the farewell party at the Backen day centre before they moved to new premises.

When the project had been going on for a little more than a month, the day centre personnel tried to contact the Kungsholmen day centre in order to enable the project participants in the day centres to meet and learn to know each other. In the long perspective, the purpose of this activity would be to enlarge their contact network, enabling all the participants to call more persons with their still picture telephones. It was also reported from DC that a loudspeaking telephone had been procured. Even at home Daniel would need a loudspeaking telephone both for facilitating the handling of the equipment and for making it easier for the personnel to follow the calls.

The group home personnel made the following statement after using the still picture telephone for six weeks:

> "Daniel has learned to handle the pushbuttons, and we have had to mark them with colours for better visibility.
>
> Daniel takes initiatives to calling, but he cannot yet cope with it on his own.
>
> Now Daniel understands better where the other party is.
>
> Daniel thinks it is 'great fun' to have a private telephone which he can partly cope with on his own."

The day centre personnel points out that Daniel's automatic dialler (brand: Bellman) sometimes calls the wrong number. Together with the company that has developed the dialler, they have tried to find the fault. Otherwise the project runs well. The loudspeaking telephone has really facilitated the telephoning procedure and increased Daniel's independence.

In the beginning of November, the day centre personnel consider themselves to have acquired a good calling routine. Daniel likes to telephone from his work and takes initiatives himself if the personnel forgets to call. "He loves to call and is interested." With the loudspeaking telephone it is easy for Daniel to call. He corrects himself e.g. if he holds a picture in the wrong hand. Daniel has also began to understand how to use Pictograms with the picture telephone. However, he still has the notion that someone is to call him, and he is more positive to incoming calls. He has now begun to call by himself from home.

In December, Daniel likes to make picture telephone calls. This has became one of his main activities during the day, and now he knows how to do it. The personnel also calls him during weekends, which makes him radiantly happy. To Daniel the still picture telephone has become an indispensable aid which has contributed to his independence and personal development.

6.5. Description of Eva (Station 3)

Eva, who is 30 years old, was living with her parents until she was 14, when she moved to a home for mentally retarded children, which was changed into a boarding home ten years later. At the start of the project, she was still living there together with five other persons, but she spent about half of the time in her parents' home. At the end of November, Eva moved to an own home with personnel.

Eva gets up around 7 in the morning, prepares herself for the day, takes her breakfast and goes to the day centre using the community's transportation service for disabled persons. One of her tasks in the day centre is to make coffee, set the table in the group room for the morning meeting and check that all group members fill out the food list. She also reads aloud which weekday and date it is. After the meeting, the real work starts. Eva takes part in a group working with screen printing on fabric for bags. After lunch she goes back to her tasks, and in the afternoon she spends a while producing diary notes with Pictograms. She uses stamps for this purpose. When she has finished, she takes the underground to the boarding home, where supper is waiting. She generally spends the evenings "reading" newspapers, having coffee, making some telephone calls or going to some course, e.g. in dancing. When in her parents' home, Eva helps with cooking and other home chores.

Eva has spent five years in special school for mentally retarded children, five more years in a school for severely mentally retarded children and four years in vocational training. She finished school in the spring of 1982. In addition to these studies she has attended 10-day courses in a "folkhögskola"[1] on two different occasions. Eva's main daytime occupation is screen printing, production of diary notes, and going to class for learning Swedish and mathematics. At present there are plans for Eva to help in a day centre café.

Social contact network

Eva has daily contact with her parents. Every week she has contact with her brother and a neighbour. In addition, Eva has contact with many friends – in most cases mentally retarded – whom she meets from time to time. She has sporadic contacts with her other relatives, who are two aunts, her mother's aunt, her mother's cousin and a few more persons. Eva also has sporadic contacts with some other friends.

Eva's spare time interests are dancing, reading weekly magazines, writing (office and school work) and participating in study circles, e.g. for spare time activities, physical training, and folk dancing. She is also interested in cooking and baking.

Functional disorders

Eva has Down's syndrome, diagnosed by a doctor at birth. The day centre personnel considers her to be moderately retarded (B level, according to Kylin's definition). Eva is visually impaired, has speech difficulties, struma and a rash. Due to her reduced eyesight she uses

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[1] Folkhögskola (literally "people's college" or "people's university") is a school directed to teaching general subjects to adults.

spectacles daily. In addition to her other eyesight limitations she is astigmatic and long-sighted. Eva has no motor difficulties, neither coarse nor fine.

Pictures/communication/language
Eva recognizes objects and persons in pictures and photos. She also recognizes Pictogram symbols, which she uses in her daily communication. Pictograms are also used for marking objects and places in hear near environment.

Eva uses mainly speech in her communication, and she is motivated to communicate. She often initiates communication herself and always responds to communication. Her main way of communication is speech, supported by signs and gestures. In writing, she uses letters, pictures and Pictograms. The communication aids she uses are Pictogram stamps and symbol cards together with "Bildtolk".

Telephoning
Eva uses the telephone every day. She calls her parents, her brother, friends, day centre personnel, home personnel and relatives. She recognizes the telephone voices of people she knows, can distinguish between different telephone signals, can dial by herself and can answer the telephone. She needs help to find the right number, but otherwise she manages to dial herself and also to receive calls. She does not terminate telephone calls, and she sometimes has difficulties understanding what the other party says. She cannot always relay a message.

6.5.1. Eva's Use of the Still Picture Telephone

Eva has been using the still picture telephone for about 4 months except for three weeks when she was abroad. She has had one telephone in her parents' home and one in the day centre, and when she moved to a home of her own in November she had a still picture telephone installed there also. The day centre personnel has brought the picture telephone home over weekends in order to provide Eva with greater opportunities to call. In total, Eva has taken part in 184 calls. 66 of them have been carried out in the day centre and 118 in her parents' home or her own home. In the day centre, 45 calls have been outgoing. The personnel has taken the initiative to most of these calls. The calls have gone to personnel, to the parents' home and to Daniel, who was described in the previous section. Incoming calls have come from Daniel and from personnel. Most of the calls have been initiated in her parents' home and her own home. About 70 % of the calls have gone to Daniel and the rest to personnel and parents. Eva herself has taken initiative to more than 90 % of these calls. Most of the incoming calls have come from day centre personnel and from Daniel.

The average call duration in the day centre has been 9 minutes. The longest call lasted for 30 minutes. The calls in the home have had an average duration of 10 minutes, and the longest one has lasted for 32 minutes. The purpose of the calls at the day centre has been chatting and asking or telling something. For 40 % of the calls,

remarkably, the personnel has not stated the reason for the call. We assume this means that the personnel has found the telephoning natural and its purpose self-evident. For the calls in the home, the purpose has been saying good night to Daniel in 40 % of the cases, and for more than 30 % it has been telephone training. During the whole project time the parents have been deeply committed, supporting Eva and also Daniel.

Eva has generally been positive to using the still picture telephone both in the day centre and at home. She has shown this by being merry and taking an active part and by carrying through the calls herself in many cases. It is especially at home that she has carried through the calls herself. In our interpretation, she must have been given more assistance in the day centre than at home. The parents have encouraged Eva to be independent and deliberately let her manage on her own. In very few cases, Eva has been unwilling to use the telephone.

Table 8. Conversational subjects – reports from home

Conversational subject No.:	1	2	3	Total
Activity during the day	12	72	19	103
Greeting phrases	99	1	1	101
Weather	2		2	4
Meals	1	3	30	34
Nearby persons		3	4	7
Future activities	1	13	30	44
The telephone call		8		8
Earlier activities	1	12	10	23
Feelings		1	5	6
Show something		1	3	4
Information missing	2	4	14	20

We have chosen to account for the conversational subjects according to the notes from the parents' home and Eva's own home. As earlier reported, most of the calls have been between Eva and Daniel. Here one can follow the development of the calls. The first subject is nearly always greeting the other person, e.g. "Hello, this is Eva, how are you?". After this, the calls have often been about meals and future and earlier activities. The information is relatively complete. Based on earlier results we had expected more instances of "information missing". There are several reasons for this. The parents have taken much care in filling out the notes and even actively cooperated in the calls between Eva and Daniel. This may reflect a difference in the way parents and personnel have understood their tasks in the project. The notes from the personnel are generally less detailed.

On the average, Eva has sent or received 5 pictures from home or 6 pictures from the day centre during each call. In most cases she has started by sending a picture of herself and receiving a picture of the other party or a Pictogram. Other frequent picture subjects are gestures, objects, and pictures of friends.

The diary notes show that Eva used the telephone the first time in her parent's home together with her parents and day centre personnel. She was then happy and interested. She sent pictures of herself and Pictograms of food (chicken, coffee and a roll). She also talked about what she had eaten. On one occasion she used the still picture telephone for calling a day centre attendant's home and asking if she could have a picture of this person on the screen. However, this person had no still picture telephone, which made Eva confused.

In the beginning of the project period, the day centre personnel tells that Eva easily gets weary of calling if she does not get an immediate answer or the line is busy. Also, she does not like to interrupt any other activity in order to use the telephone. She handles the buttons without difficulty, but she does not always push the right button. It is difficult for her to hold a picture an press the buttons at the same time, which makes her ask for help.

After two weeks of the use, the parents tell that Eva herself takes initiative to calls to Daniel but not to calls to the day centre personnel. Every time but once, Eva has been happy to use the still picture telephone. The parents think that the only exception occurred because she had not been used to being called. Eva dials the telephone number from her telephone note book. She also starts the still picture telephone, but the parent must tell her to freeze the picture and send it. When sending Pictograms, she often gets help to hold them. But she has even been holding pictures and sending them herself. A holder would be of value because it is difficult to hold both the Pictogram and the telephone receiver while pressing the freeze button. A loudspeaking telephone would help the parents to support Eva during the calls with Daniel. The calls between these two can sometimes seem meaningless from the perspective of another person. When the family goes to the country, the parents report, Eva will disassemble the equipment at home, pack it, and later unpack it in the country. This illustrates the still picture telephone's importance for Eva.

The parents report that the still picture telephone generally gives better contact with a mentally retarded person. They think they would like to have a still picture telephone, when Eva moves from their home, to have better contact with her and see how she is.

After six weeks, Eva got her first opportunity to use the still picture telephone together with a loudspeaking telephone. Earlier, Eva had had difficulties to cope with all the different tasks, holding the receiver, holding and showing a picture or signing with her hands and pressing the buttons while she at the same time had to concentrate on the contents of the call. She could immediately handle the loud-speaking telephone, which made her more independent in telephoning and reduced her need for support.

The day centre further reports that they have adapted the telephone by attaching marks with different colours on the buttons. The marks have consisted of "furniture paws", marking the buttons:

- send
- freeze
- the "lift the receiver" button on the loudspeaking telephone.

This helps Eva to find the right button and also to press it, because they are now elevated a bit from the surrounding surface. Finding a good place for the still picture telephone is also important. It is difficult to concentrate on the screen in sending e.g. a Pictogram. The picture and the hand may obstruct the view of the screen.

Eva's parents report that their daughter looks forward to the telephone calls. She takes all initiatives herself, but she needs assistance for showing the Pictograms. Eva is most used to calling by herself, making her show greater enthusiasm for outgoing calls than for incoming calls. She prepares well for her outgoing calls, freezing and sending pictures of herself without help. Unfortunately, her friend Daniel cannot always get help for sending pictures, but he can evidently switch on the still picture telephone himself and receive pictures.

After one and a half month's use of the still picture telephone, Eva is still very eager using it, the parents report. Unfortunately, she "locks" herself to certain times when she "must" call, except some time when she feels that it is important to tell someone something. In such cases she may make a call at any time of the day or night. On one occasion, her loudspeaking telephone broke down, and she had to exchange it. She took part in fetching the new telephone and was very eager to install it. Upon returning, she did not even take off her cloak before taking the telephone out of the box. Without any order or instruction she connected all the cords to the loudspeaking telephone. The only thing she needed help with was to insert the batteries.

After two months, Eva no longer talks much over the still picture telephone. Instead, she is eager to show pictures. She has "locked" on the time for calling Daniel. For this reason, most of the calls take place at 8 o'clock in the evening. Eva's brother was also involved in the training, and on one occasion he reports that Eva is eager to send pictures. Daniel sends no pictures in return. They ask Daniel repeatedly to send pictures, but he does not understand. The call lasts for 8 or 9 minutes.

The parents report that the still picture telephone is becoming increasingly important for Eva. Already in the morning she asks if she can call her friend in the evening, and during the day she repeats this question 10 or 20 times!

The day centre reports that Eva prefers to do her telephoning at home. It seems that she does not consider it proper to sneak away from work and "babble" over the telephone during work hours. She talks a lot about planning to call her friend Daniel in the evening. Eva often talks about having her still picture telephone in her new home. The parents have reported that they feel a bit worried that she will not get the support she needs to call in her new home.

In the beginning of December, Eva's mother reports: "The still picture telephone is the most important thing in Eva's life. It is even more important than her new apartment." Eva thinks of nothing but her telephone. When they train using the underground, Eva says: "They (the other passengers) do not know that I have a still picture telephone. They do not understand."

In the mother's final notes, she reports that Eva is almost obsessed by the telephone. During the whole day she is looking forward to her

telephone calls in the afternoon and evening. Sometimes she is so eager that she does not think of whether or not the person she is calling has a still picture telephone. The still picture telephone is a source of great joy for Eva and will be so also for the parents. The mother also says that "it is a real comfort to have this visual contact". Daniel, too, seems to be happy over his still picture telephone and loudspeaking telephone. Eva has found out that even other things than Pictograms can be shown on the screen, and her mother thinks that Eva is going to learn using the telephone better as she gradually gets more distance to it. "Now she is so fascinated by it that she sometimes thinks more of sending pictures than of speaking."

The parents express their gratitude over Eva's opportunity to take part in the project and get an opportunity for increased communication.

6.6 Description of Fredrik (Station 4)

Fredrik, who is 12 years old, lives together with his parents, sisters and brothers in a suburb of Stockholm. He has spent five years in a class for mentally retarded children, but he was placed in a a class for severely mentally retarded children when he was about to begin the sixth grade. At the same time, he also changed to another children's leisure centre. In principle, Fredrik is too old for the community child care. Since he cannot manage alone at home, he and one of his school mates have a one-year exemption.

Every day after having been awakened, Fredrik starts with physiotherapy. He washes himself, dresses and goes to school by school transport. After school he goes to a children's leisure centre, from where he is later picked up by his parents. He spends the evenings playing, eating and watching TV. Fredrik is interested in music and acting. He is a member of a theatre group.

Social Contact Network

Fredrik has daily contact with his parents and his two brothers. Every week he has contact with his cousins, and he has sporadic contact with his aunts, uncles, and grandparents. In addition, Fredrik has daily spare-time contact with Lena (a classmate of his own age from the school for mentally retarded children), the children's leisure centre personnel and the neighbours in the home area. He has also sporadic contacts with short-time parents.

Functional Disorders

Fredrik's parents have reported that they do not know the degree of Fredrik's mental retardation. From the type of school he has been assigned to, it can be assumed that a phycologist has considered him to have a moderate mental retardation. Fredrik has a visual impairment, a motor impairment, and speech difficulties, and he has been operated for a heart disease. He uses spectacles. His motor impairment is due to a hip defect causing pain and a stiff hip. His coarse and fine motor ability is well developed.

Pictures/Communication/Language
Fredrik recognizes objects and persons in pictures and photos. He also recognizes digits and letters. He can sound the letters and read block words, but his understanding of what he is reading is not very good. Fredrik will often initiate communication, and most times he answers when someone addresses him. Fredrik is motivated for communication, but his speech is not well developed. He likes to use gestures as a complement to his speech. At school, signs are used to support the speech. Sign language is not used in his home.

Telephoning
Fredrik does not use the telephone often. He cannot make a call himself. He needs help for dialling, even if dialling has been facilitated by the acquisition of a push-button telephone in his home. When he uses the telephone, he generally calls his friend Lena. He recognizes voices over the telephone, identifies different telephone signals and can answer the telephone by himself. If somebody writes a telephone number clearly and with big characters on a paper, he can manage to make a call, but most times he asks for help because he feels uncertain.

6.6.1 Fredrik's use of the Still Picture Telephone

Fredrik has been using the still picture telephone for about three and a half month. He has had access to three still picture telephones, situated in the children's leisure centre, at home, and in a friend's home. He has even been able to call his short-time parent. In total, Fredrik has taken part in 77 calls. The majority of the calls (53) have been made from home. Most of these calls have been from his mother, calling him in his chldren's leisure centre to tell him that she has returned home and asking him to return home too. In the evenings, Fredrik has been calling his friend Lena – who has also been calling him – or an aunt and his cousins and on some occasions the short-time parent. Most of the times, Fredrik himself has taken the initiative to the calls both from home and from the children's leisure centre.

The average duration of the calls from home has been 10.5 minutes while the calls in the children's leisure centre have lasted for 6 minutes. The purpose of the calls has been chatting and telling things. Most of the calls between the home and the children's leisure centre have been for telling Fredrik that he should go home on his own. In the beginning, another purpose was to test the telephone. The purpose of the calls to his friend and relatives has generally been to chat and say hello. The parents report that Fredrik's interest in using the still picture telephone has been very great. He has shown this by being happy and active and taking own initiatives. Also in the children's leisure centre, Fredrik has shown interest in using the still picture telephone by being happy, but not to the same degree as at home.

We have chosen to account for the subjects according to the notes from the home. As earlier mentioned, most of the calls have been between the home and the children's leisure centre and to Fredrik's friend. The first subject has generally been the day's activities or

future activities. In most cases, information on subjects two and three is missing, probably because the parents have helped Fredrik to start and then left him alone.

Table 9. Conversational subjects – reports from home

Conversational subject No.:	1	2	3	Total
Activity during the day	28	2	1	31
Greeting phrases		2		2
Weather				
Meals	1			1
Nearby persons	1			1
Future activities	12		1	13
The telephone call	3	2	1	6
Earlier activities		3	1	4
Nature, animals		1		1
Feelings	1			1
Show something	1	2		3
Information missing		26	43	69

Fredrik and his conversation mate have sent at least two pictures during each call, showing Fredrik himself, his friend, the relatives and the parents. The information on what has been shown is not very complete, and in most cases, only broad categories have been indicated. Therefore, it is reasonable to assume that the number of transmitted pictures has actually been considerably higher.

The diary notes show that there were some technical problems at the start of the project. The picture telephone that was installed at the mother's place of work did not function because there was a digital telephone exchange. Therefore, this telephone was moved to Fredrik's friend Lena. The parents report that the first call in the home was exciting. There were many laughs, especially when grimaces were shown. After a few weeks' use, Fredrik still found it very exciting to use the telephone. He showed it proudly to all visitors to the family. He liked to see pictures of himself and to send pictures. He often looked at the pictures that had been stored and especially pictures of himself.

A problem at an early stage was caused by the fact that there was initially only one person to call in the evening – Fredrik's friend Lena – who was not always at home. As a result, he begun to use the telephone less. Another problem stemmed from the fact that the family was often not at home in the evenings, preventing Fredrik from calling. Even if the telephone was used less than in the beginning, Fredrik was still interested. He often plays with the telephone, taking pictures of himself and looking at stored pictures.

Because Fredrik's friend was often absent and because she was not talking very much over the telephone, just looking at the pictures, it was decided that the telephone should be moved to Fredrik's aunt and cousins, with whom Fredrik has frequent contacts. This was done near the end of the project period. Fredrik took part in the installation of the telephone in the home of the relatives and was very proud, show-

ing how it worked. Fredrik was very interested in using the telephone and sending pictures of himself, but the cousins, who are smaller children, go to bed early, and Fredrik was sometimes disappointed because he could no talk with them.

The parent's final notes show that Fredrik is always interested in using the still picture telephone and that he especially likes to make grimaces and send pictures of them. The still picture telephone has been of good use in daily life, especially by providing Fredrik with support when he was beginning to walk home from the children's leisure centre on his own. Another effect of the still picture telephone has been a raise of Fredrik's status among the other children in the children's leisure centre. He has become an interesting person to them, and this has strengthened his self-esteem.

6.7 Description of Greta (Station 5)

Greta is a girl of 10, living together with her foster parents and brothers and sisters in a community outside Stockholm. After Greta's birth, she stayed in the hospital until she got a foster home at the age of 6 months.

Greta goes to a school for mentally retarded children in the morning and spends her time in a children's leisure centre in the afternoon. She began school for mentally retarded children at the age of seven and has now spent three years there. She listens to music a lot, and she likes to play with a ball. She often plays alone, but together with her brothers and sisters she can sometimes concentrate on playing with "Lego" parts, jig-saw puzzles etc. With a little help, she can also play with a doll.

Social Contact Network

Greta's social network consists mainly of her family, with whom she has daily contact. In contrast, she has no contact with her biological parents. She has sporadic contact with an aunt living at Borås. Greta has also contact with her two short-time families.

Functional Disorders

Greta has Down's syndrome, which was diagnosed immediately after her birth. She has no visual or hearing impairment, but she has speech difficulties. She has no coarse motor impairment, but she has some fine motor impairment, e.g. in buttoning up her clothes or tying her shoelaces.

Pictures/Communication/Language

Greta recognizes objects and persons on pictures and photos, but she has not come into contact with Blissymbols or Pictograms. She does not recognize letters or digits.

In answering the question, if Greta is motivated for communication, the parents have said yes, but they have added "sometimes". It is only occasionally that Greta initiates communication herself, but she generally answers when being addressed. She communicates by means of speech to a limited extent, but she uses sign language "sometimes". She does not use pictures or symbols in her daily communica-

tion, meaning that her principal way of communication is speech. She has no communication aids.

Telephoning
Greta does not use the telephone often. When she calls, the call is for her short-time mother or aunt. In the telephone, she recognizes voices of people in her environment, but she cannot distinguish between different signals and does not understand their meaning. She cannot make a call herself, but she can answer the phone.

6.7.1 Greta's Use of the Still Picture Telephone

Greta has been using the still picture telephone for approximately 3.5 months. She has had one telephone in her parents' home and one in a short-time parent's home. In total, Greta has taken part in 26 calls. 22 of these have been initiated from her home by her father while 4 have been initiated from the short-time home. The average duration has been 11 minutes. The longest call lasted for 30 minutes.

The purpose of the calls has been chatting and training telephoning. Conversational subjects are summarized in the table below.

Table 10. Conversational subjects – reports from home

Conversational subject No.:	1	2	3	Total
Activity during the day	12	2	1	15
Greeting phrases	1			1
Weather				
Meals				
Nearby persons			1	1
Future activities	3	3	2	8
The telephone call	3			3
Earlier activities	2	4		6
Feelings			1	1
Show something				
Information missing	5	17	21	43

Most of the calls deal with the day's activities, earlier events and future activities. However, information on subjects 2 and 3 is often missing. The number of pictures sent has been, on the average, at least 2 per call. The pictures have shown Greta and her conversation partner.

According to diary notes, Greta was initially only moderately interested in the still picture telephone. She was often tired in the evening, when it was time for calls, and she gave up if she did not get an immediate answer. The short-time parent thought that this can be due to the demands caused by telephoning. Also, Greta did not want to interrupt any other activity in order to use the still picture telephone. She had no patience in handling it. For various reasons, the use of the telephone was not continuous. Towards the end of the project period, Greta's interest increased, and in one case she waited

for nearly 25 minutes in calling her short-time parent when the line was busy.

According to Greta's parents, her use of the still picture telephone has undoubtedly given her knowledge and experience which she will enjoy and have use for in the future. However, the project has put strong demands on Greta considering her disability and age. Especially, it has been difficult to make the telephone contacts continuous. In other words, she did not want to call as often as project management had desired. Two or three calls a week was just right for Greta. With this call frequency, she enjoyed telephoning very much. Finally, the parents say that Greta will undoubtedly understand the value of the still picture telephone better when she grows older. Therefore, they would like to keep the still picture telephone. Greta has one short-time family more, and after the end of the project period, the parents a planning to let the still picture telephone circulate between the short-time parents. In addition, Greta will go to a camp in the summer, bringing her still picture telephone along in order to be able to keep contact with her parents. This will give her a great security.

6.8 Description of Hanna (Station 6)

Hanna, 6.5 years old, lives with her parents and brothers and sisters in a community in the Stockholm Archipelago. She has been in a day nursery and has just began first grade in the local nine-year compulsory school together with her friends. She is "individually integrated" into the school. After school Hanna goes to the children's leisure centre, where she spends a few hours before going home. During the weeks, she spends the evenings playing a little, having dinner with her family, watching TV for a short while and going to bed, where somebody reads her a fairy tale.

Social Contact Network

Hanna has daily contact with her parents and her brothers and sisters, and every week she has contact with her grandparents. She has sporadic contact with her cousins, aunts and uncles. She has daily contact with a neighbour and weekly contact with a friend. Hanna's greatest interest is horse riding.

Functional Disorders

Hanna has Down's syndrome. A psychologist in the service system for mentally retarded persons has judged her as moderately mentally retarded, based on the Griffith test, in the spring of 1989.

Hanna is visually impaired, hearing-impaired (totally deaf on one ear) and has speech difficulties. She uses spectacles and a hearing aid daily. She has a coarse motor impairment, making her clumsy. In contrast, she has no fine motor difficulties.

Pictures/Communication/Language

Hanna recognizes objects and persons in pictures and photos, and she recognizes letters and digits. She always initiates communication and answers to communication. Hanna is motivated to communicate and

uses speech. Earlier she communicated by means of signs, but today she mainly uses speech.

Telephoning

Hanna uses the telephone sometimes to contact her grandmother or some friend. Hanna's mother is not quite sure that Hanna recognizes the telephone voices of people in her environment, and she is not completely certain that Hanna knows the difference between the various signals. In many cases, for example, she cannot distinguish between the signals from the egg-boiling clock and the telephone. Hanna can make a call herself, but still she wants help. However, she likes to answer the telephone herself.

When Hanna is going to make a call, the mother reports, the procedure is usually as follows. Hanna dials if someone tells her one digit at a time. She recognizes the digits. After that, her conversation is mostly yes or no answers to concrete questions from e.g. grandma. Sometimes she gives a somewhat longer answer, but she never takes initiative to telling something on her own. Due to Hanna's speech difficulties, it is hard to understand what she says.

6.8.1 Hanna's Use of the Still Picture Telephone

Hanna has been using the telephone for a month. She had two telephones, one at home and one in her grandma's home. 12 calls have been made, 8 from Hanna's home and 4 from grandma's home.

The average call duration was 13 minutes. The purpose of the calls was in most cases to chat, test the telephone and say hello. In the beginning, her interest was great. She showed this by being happy and keen to get contact.

Due to the small number of calls, the conversational subjects are not presented in a table. Most of the calls deal with everyday activities, future activities, and testing the telephone. The number of pictures transmitted in each call was at least three.

The telephone was installed on September 8. On that day, the first call was made, becoming a test of the whole system. According to the parents this was exciting to all those present. Already on the following day Grandma, who is Hanna's call partner, went away for a week's vacation. The mother reports that they started to make calls continuously in mid-September.

Hanna becomes very angry when Grandma does not understand her. Therefore, the parents need to hear what is said in order to be able to help. In many cases, Grandma puts questions to be answered with yes or no in order to simplify the conversation. This makes it difficult for the parents to know what the call is about. Almost at the outset the parents pointed out that Hanna needed a loudspeaking telephone.

A loudspeaking telephone was installed, and this worked fine. Hanna sometimes needs encouragement in order to be motivated. The parents reported that it was difficult to find time for calling every day, making the whole thing sometimes a bit forced an unnatural. The time of the call was often a bit late for Hanna, who is tired in the evening.

After a month of use, the parents report that they have not been good at calling during the last part of the period. Also, they had been meeting Grandma rather much, which diminished the motivation for calling her on the same day. They were also beginning to feel the whole thing to be tiresome because they always had to tell Hanna to call. In the beginning she found it amusing, but rather soon she became unconcentrated. It feels strange and unnecessary to call the same person every day, and everything would certainly have been better if they could call more than one person. The parents would like a system where Hanna would talk into the microphone while they could at the same time listen to the loudspeaker. They found the whole thing labourous, but they did not want to quit.

After a little more than a month, Hanna's participation in the project was discontinued. The mother says: "I am sorry that we have not handled our part of the project well. Naturally we can do a lot of explaining (away) even apart from lack of time. After all, we have tried, but it has been a bit hard because we have only one person to call. The initiative to call Grandma has mostly come from us – it does not feel natural to call the same person every day. Now we have moved the telephone to one of Hanna's friends, which will make it work well for a few days – as long as the charm of novelty lasts. In any case, a loudspeaking telephone is very fine. It can obviously be used for all calls."

The telephones remained with Hanna until the end of the project period. Then it was decided that they were to be returned because the family had no use for them.

Next chapter contains a summary of the number and duration of the calls and the number of transmitted pictures together with results from every person in the project.

7. Summary and Results for Each Person

Table 11 on next page shows the call frequency for the eight persons in the project. Among the *adults*, Eva and Daniel are those who have used the telephone most, and from the person descriptions we know that a great deal of their calls have been between the two of them. Anders and Carina have not used the still picture telephone to the same extent, but still, they have used it regularly. Britta has used the still picture telephone very little. She left the project after a month and did not want to keep the still picture telephone.

Among the *children*, Fredrik has used the still picture telephone most. He has shown a very great interest in it, and it meets a need that he has. Greta has been using the telephone continuously, but not often. Hanna has not used the telephone functionally, and her participation in the project was discontinued.

7.1 Result for the Eight Participants

Anders has had one still picture telephone in his group home and one in the day centre. He has called his friends himself, sometimes without the personnel or the father noticing it. He takes own initiatives to telephoning and gets a lot of encouragement to independence. He has sent many pictures, and it shows that he has had much support from people in his environment, especially his father. It is also clear that his daddy has felt a deep involvement and taken great care to fill out the notes, while the personnel has sometimes forgotten to do this.

Anders' motor impairment has made it difficult for him to use sign language over the telephone, which is nuisance because he usually signs. For Anders, the still picture telephone has in some situations brought a restriction in conveying messages because he needs both hands for signing. Anders has had access to a loudspeaking telephone, which has made things easier for him. The adaptations suggested by his father, a pedal switch for freezing the picture, should be useful also for other persons with a motor impairment. The telephone brings a certain security to everyday life, even if Anders would like to be able to call more persons. In spite of the difficulties caused by Anders' motor impairment, both he and his parents have found still picture telephoning to be a very positive experience.

Table 11. Number of calls, call duration (minutes) and number of transmitted pictures

Person	Number of calls			Duration, minutes		Number of pictures	
	Day act.[1]	Home	Total	Day act.[1]	Home	Day act.[1]	Home
Adults							
Anders	26	33	**59**	8	4	5	2
Britta	10	5	**15**	8	10	3	5
Carina	36	22	**58**	12	11	2	1
Daniel	106	39	**145**	10	10	5	4
Eva	66	118	**184**	13	9	6	5
Children							
Fredrik	24	53	**77**	6	10	3	2
Greta	23	28	**51**	11	10	2	2
Hanna		12	**12**		14		3
Total	291	310	**601**				

Britta has had one still picture telephone in the day centre and one in her group home. Already after a month's trial, she reacted negatively to the telephone and did not want to use it. She appeared anxious and uncertain already at an early stage and found the whole thing difficult. Her telephoning difficulties may be caused by her mental retardation but also by her visual impairment. However, the reason could also be insufficient support. We are uncertain of the cause. We only know that her reaction was negative and that the day centre personnel considered the reason to be too great difficulties for her. No adaptations of her telephone were made.

Carina has had one still picture telephone in her group home and one in her day centre. The adaptations of her telephone consisted of symbol marking of the function buttons. She also was given a loud-speaking telephone. The continuity of her training has been disturbed by absence caused by illness, both in Carina and personnel, and in absence for other causes, e.g. work outside the day centre. In spite of this, she has all the time been interested in calling. The group home personnel has had support from the work therapist in the day centre, but she has felt unsure in her role. For example, she has not known exactly what was her responsibility. The basis for the telephoning was placed in the day centre, but in Carina's case it might have been

[1] Day act. = the location where the person is active during the day. For the adults, this is mostly the day centre, for the children, leisure-time home or the home of a grandma or short-time parents.

better to have it in the group home because she likes best to call from there.

Carina does not take initiatives herself, except for the calls she makes to her friend Pelle, in spite of her having a positive attitude to the still picture telephone. It also turns out that her interest in calling increases after a time of use of the telephone at the same time as she becomes more active in the telephoning. Her interest in Pictograms has increased because they can be transmitted over the still picture telephone. The personnel considers that her communication development can be aided by means of the telephone. In addition, the still picture telephone enables her to keep contact with Pelle; they have been living in the same nursing home for several years. In this respect, the still picture telephone has even an important social function. The telephone has also been used for discussions on emotionally loaded subjects, e.g. when Carina gets sulky and goes home from the day centre before the end of the day's work. Her joy and inclination to call has increased because of the fact that Pelle has now got a still picture telephone of his own, and according to the personnel it has been important to Pelle, too, to be able to see a picture of Carina.

Daniel has one still picture telephone in his group home, one in the day centre and one in Eva's home. Especially at the start of the project he had difficulties to understand that other people, who have no still picture telephones, cannot see a picture of him. Daniel has sent many pictures, but especially in the beginning he had difficulties to understand that the person in the picture is the same person who talks at the same time. He has also difficulties in terminating a telephone call, and most times he lets the receiver hang when he has finished talking. In the course of the project his attitude to calling has become more positive, and he has become more inclined to take initiatives of his own and use the telephone continuously. A difficulty for Daniel has been to understand that one cannot transmit speech and pictures over the telecommunication network at the same time.

The adaptations which have been made in order to make it easier for Daniel to telephone on his own are colour marking of buttons, installation of a loudspeaking telephone, and installation of an automatic dialler (Bellman). Daniel has a more positive attitude to receiving calls than to making calls himself. The personnel of the day centre and the group home say that the still picture telephone has become an important and indispensable aid for Daniel, contributing considerably to his personal development and independence.

Eva has had one still picture telephone in her group home, one in her parents' home, where she lives every other week, and one in the day centre. She has also been able to call Daniel. Eva has sent many pictures. Her enthusiasm is greatest for outgoing calls. According to the parents, the still picture telephone gives better contact than a regular telephone. Eva shows the day centre personnel that she prefers to call from home. The personnel thinks this is because she finds it important to mind her work, being unwilling to chat over the telephone during work hours. However, the telephone has become the

most important thing in Eva's life. She sometimes thinks more of sending pictures than of speaking. Her mother has reported that Eva understands that not all people have still picture telephones. During an underground trip she said to her mother, referring to her fellow passengers "They do not know that I have a still picture telephone".

The adaptations she has got are installation of a loudspeaking telephone and marking of the buttons with "furniture paws" in different colours. The still picture telephone has increased her possibilities for communication and given her an opportunity to maintain social contacts.

Fredrik has one still picture telephone at home, one in the children's leisure centre and one in a friend's home. He has also been able to call his short-time parent. Fredrik has used the telephone to call his home, informing the parents that he is ready to go home from the children's leisure centre. He has been very interested in calling. When a still picture telephone was installed in a friend's home, the communication did not work very well because this girl, who is normally very talkative, became quite silent and "hooked" on the pictures. Also, she had probably little support in her home. Therefore, the telephone was moved to an aunt and uncle. After this, the communication functioned better.

Greta has had one still picture telephone at home and one in the home of one of her short-time families. Greta has two short-time families and takes turns living with them for two weekends a month. From now on, one of her telephones will be moved together with Greta to the family with which she spends her weekend. She can then call her parents and see pictures of them, which will provide herself and the parents with a feeling of security. She has sometimes been quite uninterested in calling, especially if she has tried to call and got a "busy line" signal. The parents think that she will call considerably more now, when the project is finished, because the demands on her will diminish. The telephoning will be more on her own terms.

Hanna has had one telephone at home and one in her grandmother's home. It has been difficult to motivate Hanna for calling in the evenings, when she has been tired. She has had her first term at school, spending the afternoons in the children's leisure centre. Probably the number of changes in Hanna's situation has been too great during this period, and her interest in picture telephoning has not been sufficiently great.

8. Discussion

The project presented in this report has been aimed at finding out what use mentally retarded people can have of a still picture telephone in their daily life. Our working hypotheses has been that persons with a mental retardment can understand a message more easily when speech is enhanced with a picture because this provides both auditory and visual information. We assumed that it might be of great help for a slightly or moderately mentally retarded person to see a picture of another person in addition to hearing his or her well-known voice in the telephone receiver. Furthermore, we assumed that positive experiences of the still picture telephone might stimulate the retarded person to further telephone contacts, thereby increasing his or her independence. As we have pointed out in the introductory chapter, it has turned out that consistent and adapted communication training and suitable technical aids can enhance the communication possibilities of many mentally retarded persons who have a more or less serious speech impairment. In turn, improved communication possibilities can contribute to the person's ability to influence his environment and make his own choices. This is of extreme importance for personal development, independence, participation in social life, and quality of life. The increased communication possibilities provided by the still picture telephone could thus improve the quality of life of the retarded person by giving him or her increased possibilities for social contacts and better control over his or her own life. In addition, it would provide security both for the retarded person and his or her folks.

The following questions have been central in the project:

- Can picture transmission over the telecommunication network facilitate telephone communication?

- Can the still picture telephone contribute to increasing the possibilities for social contacts, thereby raising the individual's quality of life?

- Can the still picture telephone be regarded as a communication aid for mentally retarded persons?

Telephoning imposes requirements both on the individual and on the environment (physical, psychological and social). A basic requirement is for the individual to be motivated for telephoning and be able to use

the telephone or have access to appropriate support. Furthermore, the persons in the environment must take a positive attitude, have a keen ear and be willing to telephone. There must be one or more persons to call and to be called by. Thus, there are sharp requirements both on the retarded person and on those who are going to communicate with him or her over the telephone. Light (1989) has designed a model of communicative competence in terms of functional aspects, adequacy and skills). This communicative competence is needed for telephoning. For using the still picture telephone, especially the operational and sociorelational ability is relevant.

Operational Ability

The operational ability can be decisive for the possibilities to use the still picture telephone. For this reason, various adaptations have been made. Most of the project participants have had a loudspeaking telephone, which has made it easier for them to handle the telephone and also helped parents and personnel to assist in the calling. Many of the parents say that the use of the loudspeaking telephone has facilitated telephoning considerably. Another adaptation which has been proposed by parents is a holder for pictures, freeing the hands and facilitating picture transmission.

Many of the participants have had difficulties in handling the function keys on the still picture telephone. The keys have the same colour as the rest of the equipment, making it difficult to discern them. Furthermore they are small and flush with the surface. Raising the function buttons would probably facilitate handling for some of the participants. For many of them, the keys have been made easier to find by marking with various colours or symbols.

For a person with a motor disability, an automatic dialler can be a valuable aid. Such a dialler is preprogrammed and dials a predetermined call partner upon pressing a single button. Some of the participants (e.g. Daniel) have used such a dialler, and this has been working well.

Sociorelational Ability

Sociorelational ability is connected with an ability to acquire knowledge, judgment and skill in connection with the social rules for interaction. In the telephoning case, the ability to initiate, maintain and terminate a call are in focus. Being able to listen to the other party and wait for an answer is also important in this connection. Both call participants must have this ability. The difficulties found during the project time have been of various kinds. Many of the project participants have not initially been inclined to take initiative to telephone contact, but they have developed this ability during the project time. Carina is an example. Initially, she took few initiatives, but she became more active in the course of the project. Her inclination to call also increased when her friend got a still picture telephone, showing the importance of having a friend to call. Daniel,

on the other hand, has had difficulties both to initiate a call and to terminate it, which can be due to various factors. Eva has preferred to call from home and liked outgoing calls best. In most of the project participants, the ability to use the telephone in a functional manner has improved in the course of the project, and it can be assumed that the socio-relational ability has increased in connection with telephoning.

A question which has become increasingly important in this project is the personal integrity of the project participants. As far as the children are concerned, this has not been a great problem, because their parents are generally considerably more involved in the lives of their children. Parents often listen to calls made by the children, especially if they have to help them in telephoning. Also, a child sometimes need help from a grown-up person to understand what the other party asks or talks about. In contrast, we have been hesitative with respect to the right of listening to calls made by the adult project participants. However, in order to get an idea of how the telephoning is carried out, wether or not telephoning is facilitated by picture transmission, and what use the mentally retarded person can have of the still picture telephone in his or her daily life, personnel and parents have had to listen to calls during the project time. We know that both personnel and parents have made ethical deliberations about listening to the calls. In several cases they have reported – especially in connection with telephoning by the adults – that they cannot report on the subjects of the call or the pictures transmitted because they have not been allowed to listen in.

Already at the start of the project we discussed with the day centre personnel to which extent a third person had the right to listen to the private calls of the mentally disabled project participants. We decided not to pursue this question "in absurdum". Therefore we consider it as positive that the personnel has shown consideration for the project participants, refraining from imposing themselves upon them. Some of the adult participants have even made it clear to the personnel that they do not want the personnel to stick around after establishing the call because they want to talk "between four eyes". Naturally, such a sign of indepence should be encouraged.

For the parents of the adult participants, it has been more difficult to decide wether or not they should listen to their children's calls. One reason is that they have tried to adhere as much as possible to the objective of the project. They have been very keen to fulfil their part of the project. Probably, the relationship between parents and children makes it more natural to stay around when the adult "child " speaks over the telephone. However, several parents have found out that not even their "children" have wanted to have them around during the call. The fact that the adult project participants gradually so clearly have shown that they want to talk in privacy indicates that they have developed a certain independence in the course of the project.

Ethical questions in project work with mentally retarded people are generally difficult to handle. Mentally retarded people have often difficulties to understand what it means to be part of a project and how the results are to be used. However, the situation is not unusual for them because they are always in situations where other people make decisions for them. The ethical question is important to consider

in all projects where people take part, but it can be even more delicate when mentally retarded people are involved. Their possibilities to really understand what they are involved in are limited, and the judgment must rest with the research workers and others who are pursuing the project.

We want to exemplify this with the following episode from the empirical material:

> Eva sometimes calls her male friend Daniel, wanting to chat, just like other young and grown-up people. It is not self-evident that they want anybody else to see which pictures they transmit or to hear what they talk about. After all, they are adults. For this reason it is important that they get the best possible assistance in order to learn, as soon as possible, to handle telephoning and picture transmission on their own.

8.1 Communication Related to the Model by Bloom and Lahey

Communication can be described on the basis of various models. The nowadays classical model by Bloom & Lahey (1978) employs the concepts of *Communicative form, communicative content* and *communicative use*.

The communicative *form* in this project is telephoning with picture transmission, thus both auditory and visual. Because many of the project participants have difficulties with speech and communication, it has been an advantage to be able to transmit a picture and use even the visual channel for information. Probably, this has greatly facilitated understanding the contents of the calls. The still picture telephone also enables the users to transmit various complementary alternatives to speech, e.g. signs, Pictograms, pictures or Blissymbols. In the project, chiefly Pictograms and various kinds of pictures have been used. Some of the participants have been using signs, but in this respect, the still picture telephone has an important limitation. The person who wants to sign must use both hands for this. For this reason, he or she cannot "freeze" and transmit this sign by himself or herself. In all cases where signs have been used, another person has assisted in the transmission. At the end of the project, one parent suggested that this problem could be solved by connecting a pedal switch to the freeze button.

The *contents* of the calls have mostly been connected with daily activities. The calls have also been dealing with past, present and future time, handling of the telephone, etc. The pictures to which the participants have had access do not seem to have been steering the calls to any great extent. Instead, they have been adapted to the situation. The pictures have often been used in a particular sequence. First, "greeting pictures" of the participants have been sent. Afterwards they have been talking over various subjects, exemplifying with pictures, and finally "farewell pictures" have been sent. The still picture telephone can be said to have provided for an amplification of the subjects of the call, probably giving the call richer and more complex contents.

The use is connected with the purpose of the call. In our project, a prominent purpose has been to tell things, ask about things, and train the use of the telephone, but another part of the use has been to chat. It has turned out that the interest in just calling and asking how things are – i.e. chatting – has gradually increased. This means that the use of the still picture telephone becomes more similar to normal telephoning in the course of time.

Especially for some of those who have had only one person to call, it has been more difficult to get motivation for using the still picture telephone the longer the project has been going on. After the "charm of novelty" of the first time, interest may fade if there is nothing to talk about and if the call does not fill a real function. It has been especially difficult to get the yongest child, Hanna, to call. When it comes to Hanna's use of the telephone, her mother takes a great a part of the responsibility for using the still picture telephone less than expected. It has been difficult for the parents to get involved in telephoning when they return home in the evening. In general, they have been too tired to call. For Hanna, this has meant that she has sometimes called her grandmother several times during the same day, which has been abnormal. The things they have been able to talk about are so limited that it is not possible to maintain a communication artificially just for the sake of telephoning. In our opinion, it has to be taken into account that children generally do not use the telephone until they have understood the advantages of telephoning, which can happen rather late.

For Eva and Daniel, the telephoning has filled a real function. They have been very motivated to talk with one another, and their talks have been natural. Also for Carina, the telephoning has filled an important function, both in the calls with her friend and for resolving misunderstandings in her place of work. The day centre personnel emphasize that they have found the still picture telephone to increase their possibilities to discuss misunderstandings with Carina. Also Anders and Fredrik have been using the telephone in a functional and natural way. One conclusion about the ability to use a still picture telephone in a functional way is that there has to be a "natural" call partner and "natural" motives for telephoning.

8.2 Communication Related to Kylén's Communication Chain

One of the questions we have wanted to illuminate is what is affected by the use of a still picture telephone, i.e. which conditions are changed in comparison with the use of an ordinary telephone. Kylén's communication chain (1983, page 6) can be used for exemplifying which advantages picture transmission may have in telephone calls. See Figure 2!

It can be assumed that the willingness to communicate increases when more than one channel for communication is available and the situation can be made more concrete by means of the picture, which can be retained. Because up to six pictures can be stored in the Panasonic still picture telephone, the user can go back to previously transmitted pictures after the call and look at them again. This

provides an opportunity to return to various subjects which have been discussed during the call and discuss them further e.g. with personnel or parents, and the mentally retarded person himself or herself can choose which parts of the call to share with the persons in the environment. Above all, the still picture telephone helps concretizing the information that has been conveyed, which is a good support for a mentally retarded person.

1. Idea (idea stemming from emotion or knowledge)	may provide new ideas
2. Willingness (willingness to share one's idea with someone)	easier to present one's idea and to get feedback
3. Translation. The idea must be translated into a language	both visual and auditory language
4. Presentation of signs with gestures, pointing, etc.	can be sent via picture and sound
5. Media. Choosing the way of conveying the message.	an enhanced medium with two channels for information transfer
6. The receiver must be able to apprehend the sign	gives additional information attention is reinforced
7. The receiver must be willing to receive the message	further motivation via the picture
8. The receiver must be able to interpret the message	support from picture facilitates call concretization via the picture
9. Understanding what the partner wants to convey	picture and sound give two channels
10. Confirmation. The receiver confirms his or her understanding, e.g. by nodding	both auditory and visual confirmation possible

Figure 2. Kylén's communication chain for telephoning

We have already stressed the importance of memory functions in conjunction with various measures for facilitating the daily lives of mentally retarded persons. In connection with the use of a still picture telephone, it is especially the picture as a complement and enhancement of the voice that provides support for short-time memory. According to Light & Lindsay (1990) the function of short-time memory can be favourably affected by repetition and integration into bigger and more meaningful units as well as by external memory aids. The still picture telephone provides for repetition and for the simultaneous use of picture and sound, which may give the individual bigger integrated units to deal with, thus compensating for shortcomings of short-time memory. For long-time memory, the possibility to store pictures may be important, especially for the cognitive processes. After the call, as previously mentioned, a call participant can look at

the pictures again, thereby cementing the cognative processes used in the call. Many of the project participants are in the habit of looking at the pictures again after calls.

8.3 The Still Picture Telephone's Usefulness for the Individual Project Participants

Among the project participants, only Anders can be considered to be *lightly* mentally retarded. The others have a moderate mental retardation. It is obviously impossible to judge to which person the still picture telephone's usefulness is greatest because the telephone has different significance for different persons.

At the start of the project it was reported that Anders seldom used the telephone. Already after about two weeks, he had learned to use the still picture telephone entirely on his own. Also, he himself takes initiatives to calling. The greatest obstacle for Anders is his motor impairment. The still picture telephone will mean security for Anders and his parents when he moves away from home.

At the project start, Britta sometimes used the telephone to call her contact person. She could not dial herself, but she could answer a call. When Britta got the still picture telephone, she was initially positive, but already after a month she firmly said that she did not want to call any more. She experienced the still picture telephone as something very negative. The work therapist in the day centre thinks her negative attitude is chiefly caused by her inability to handle the telephone. It is not only too difficult to use, but she does not understand what use she can have for it.

Carina seldom used the telephone before the start of the project. However, she sometimes took an initiative to calling, but the group home personnel always helped her to call the day centre and her friend Pelle. Apart from that, she was not interested in telephoning. She has shown great interest in the still picture telephone and treated it as a precious asset. When the project had gone on for a month, a still picture telephone was also installed in her friend's home. She was very happy to be able to see a picture of him. This is especially valuable in this relation because Pelle cannot talk and is therefore restricted to listening to Carina. Now she uses the telephone more than before, and the work therapist considers the still picture telephone as a means of stimulating communication and social relations. They are now planning to start using Pictograms as a communication means more continually. Because Pictograms now can even be transmitted over the telecommunication network, Carina's motivation for using them is increased. For Carina, the still picture telephone has been of great use and given her great joy.

Daniel, earlier, seldom took an initiative to telephoning. Initially, he had difficulties in understanding the picture transmission. It was difficult to understand that the same person who was heard in the telephone receiver was also shown on a picture, and he made many guesses before he was certain of this. Probably, the reason was that he could not imagine the possibility of seeing the other party even "in his wildest phantasy". However, soon he began to understand how the whole thing worked, and after one month he was well familiar with

the still picture telephone. Daniel now uses his telephone every day and takes great care in doing this. According to the personnel, the still picture telephone has become an indispensable aid for Daniel, contributing actively to his independence and personal development.

Eva had a starting position that was different from the starting positions of most of the other project participants. She was already used to calling her parents, friends and personnel on a daily basis. Primarily, the parents report that Eva has been contacting Daniel on her own initiative. Both for Eva and Daniel, the still picture telephone has a sociorelational function. The parents point out especially that it is as a general rule easier to get contact with a mentally retarded person over the telephone if one can simultaneously see a picture of this person. In addition to communicating with Eva, her parents have also been using the still picture telephone for communicating with Daniel. In the course of the project, the still picture telephone has became increasingly important to Eva. Every evening, after work, she now uses her telephone for calling her friends, and it is a great asset in her daily life.

The three children in the project used the still picture telephone very seldom in the beginning. None of them could dial by himself or herself. We maintain that children generally use the telephone more seldom than young and adult people. The greatest difference is that adults normally have a motive for calling, something to tell. They need information and want to put questions. It has been difficult to find conversational subjects which the children themselves have found important to convey with still pictures. However, the still picture telephone can be expected to get a greater importance for both Greta and Fredrik in the future. Greta's parents say that they will let the "receiving" telephone be moved with Greta between her two short-time parents and her home. This will enable Greta to contact her parents even when she is absent during the weekends. Fredrik's parents, too, see this possibility. Many children go to a holiday camp or colony for a few weeks during the summer. They can then bring the still picture telephone along. The children get a feeling of security when they can see the parents in a picture at the same time as they talk to them. This has been functioning least well for the smallest child, Hanna, and in this case, the mother takes on responsibility. The situation has been artificial to Hanna, who has been forced to call her grandmother all the time. Events have not been frequent enough to give motives for calling as often as project participation has been calling for.

There is a certain difference in telephone use between children and adults. It has become quite clear that the adults need a still picture telephone more than the children do. This statement is based on the diary notes, indicating that the still picture telephone has contributed more to increasing independence, involvement, and social relations in the case of grown-up users.

In the cases where the still picture telephone did not come to a functional use, there is a common denominator. Both Britta and Hanna have had less support than the others. Anders and Britta go to the same day centre, but only Anders found the still picture telephone to bring great usefulness and joy. We think the reason can be that the

work therapist who has had the main responsibility for training has been ill during a great portion of the project time and that the others in the personnel group have not been quite sure of which role they were supposed to play. In addition, Anders is only lightly mentally retarded, and he has had much support from his parents. Britta is moderately retarded, and the personnel has not been able to motivate her to call. In the case of Hanna, we have earlier accounted for the main reason, being that the parents, at the end of a long day's work, have not managed to train her sufficiently when Hanna herself has not been motivated and not taken any initiative.

In summary, only two of the eight project participants have not found the still picture telephone to bring usefulness and joy. The other six have greatly enjoyed using their still picture telephones and gradually enhanced their communicative competence in telephoning. The still picture telephone has also given them possibilities for increased independence.

9. Conclusions

Already at the start of the project, we saw difficulties in starting a project in the middle of the summer. Many people were leaving for vacation, and in many places the activity level was low. Nevertheless, we succeeded to select day centres for participation and – with assistance from their personnel – also project participants. We do not think a statistical sampling method would be realistic in a project demanding such great involvement on the part of personnel and parents. The practical tests need motivated and knowledgable people who can spend sufficient time and produce sufficient work. For this reason it would be impossible to select project participants in any other way. In handicap research, test groups are generally small. However, the general opinion among international handicap research workers is that one has to accept small test groups. This is clear from the research symposium with leading research workers in the communication field which was held in Stockholm 1990 (Brodin & Björck-Åkesson, 1991).

The telephoning report form that we designed at the start of the project was very comprehensive. In all, 20 variables were coded. (See Appendix 4). In presenting the results, we only account for some of these variables. We have made a selection of variables which we consider to provide the most relevant information together with the qualitative data that have been collected. Their are two reasons for not reporting all the variables from the form. We consider the information provided by a complete account of every variable to be limited, and the forms have been filled out with a varying degree of detail by different persons.

In any future studies of a similar type, only one form should be filled out for each call. This form should be filled out by the person who is together with the project participant at the telephone call. In addition, it should be stressed that every person who fills out the form should sign it, enabling the person working upon the material to see who it is. It is reasonable to assume that different persons have different degrees of motivation for filling out the forms. An analysis of the results shows clearly that the interest in filling out the forms varies from person to person. Some of them have filled out every form with great care and answered all the questions. Others have only filled out the most elementary information.

In the beginning of the project, the calls were often dealing with telephoning as such and the transmission of pictures. Gradually this aspects of the calls becomes "de-dramatized", and a functional use

emerges (example: Eva and Daniel). The difference between these types of call is great, also in terms of contents. With the change of the contents, the requirements for the personal integrity of the project participants has increased. It has become more objectionable to listen to the calls. As we have pointed out earlier, this type of project produces great difficulties from an ethical point of view. Do we have the right to listen to calls exchanged by the mentally retarded participants? Since we have considered it important to get a picture of the need for still picture telephones, we have found it necessary to get certain information in order to be able to judge the usefulness of the still picture telephone for the various test persons. Today we know that the usefulness is great, and now they will be allowed to carry out their conversations in all tranquility without any performance requirements and without eavesdropping by a third person. They will be able to use their telephones in exactly the same way as we all want to do, for maintaining contact with our friends.

The conclusions we are drawing from this project is that *certain factors are decisive for a functional use* of the still picture telephone. These factors are indicated below.

- The user must have a real need for the still picture telephone
- The calls must be natural, i.e. not forced
- The initiative to the calls must come from the mentally retarded person
- The mentally retarded user must have a possibility to call several persons who are important to him or her
- Positive experiences from the use of the still picture telephone
- Continuity of use

Not least important, the still picture telephone must be functionally adapted to the mentally retarded person, enabling him or her to learn how to handle the telephone. Also, the mentally retarded user must have good support from the environment, and there must be a cooperation between the persons who support him or her.

Based on our earlier experience and knowledge in this field, however, we consider the results obtained in this study to be valid also generally, provided that the factors mentioned above are observed. **In conclusion,** the still picture telephone has turned out to *facilitate communication* over the telephone for mentally retarded persons. This conclusion is founded on the following results from the project:

- Still picture telephoning gives both visual and auditory information (i.e. two information channels are used)
- The frequency of usage increased in the course of the project
- The motivation increased, and telephoning became gradually more independent
- Involvement and initiative to use the telephone increased
- Continuity increased, i.e. regularity and frequency
- The pictures became more relevant and functional

The results of the empirical study, in our opinion, show that the still picture telephone can contribute to *increasing the possibilities for social contacts*. Quantitatively and qualitatively, however, this effect has varied between the project participants. The available number of still picture telephones has been a limiting factor.

Anders The contacts, especially with his father, increased.

Carina The contact with her friend increased.
The telephone has been a link for solving conflicts between Carina and the day centre.

Daniel The contact with Eva increased.
The contact with the parents increased.

Eva The contact with Daniel increased.
Also increased contact with parents and friends.

Fredrik Can walk home from the children's leisure centre on his own, security factor.

Greta Gives security because the still picture telephone can be moved to her short-time home.

9.1 Comments

Before long, Anders will move from his parents' home to a home of his own. The parents will then feel more secure by being able to have also visual contact. To Carina, the still picture telephone means a more independent life because she can have contact with her friend whenever she wants, not when the personnel decides. To Daniel and Eva, using the still picture telephone has become one of their most important pastimes, and both of them feel that it has greatly changed their lives. In case of Fredrik and Greta – two of the children – the still picture telephone gives security to the parents but also to the children when they are away from home, staying with their short-time parents or e.g. in a summer colony.

Informal contacts with the project participants a couple of months after the end of the project have shown that the use of the still picture telephone is becoming gradually more functional and forms a natural part of their daily life.

Even though many of the participants have found it difficult to make calls with the still picture telephone, all of them except Britta and Hanna have found this telephone to be a source of great joy and usefulness. The still picture telephone, in our opinion, can be considered as a good *communication aid* for many mentally retarded people.

9.2 Visions for the Future

All the project participants except one (Anders) have had a moderate mental retardation. We consider it reasonable to think that even severely retarded persons could enjoy a still picture telephone and

have use for it. In case of this group, however, other variables can be considered to be interesting. Above all, we assume that the emotional aspect is considerably more prominent than the purely practical aspect because they will not be able to handle the telephone and establish calls by themselves. They will depend on assistance in telephoning, but it is reasonable to assume that the emotional revenue of seeing a close relative is nevertheless important enough for the still picture telephone to be considered as a communication aid for them. The usefulness aspect is mainly connected with the people who work with the mentally retarded person, e.g. day centre personnel. They can use the still picture telephone for an activity which encourages this communication, and in addition, it can be a means of increasing the mentally retarded person's independence. Both these aspects can be expected to help the personnel in their daily work. As a continuation of this project and the experiences we have from the still picture telephone, a practical trial with a small number of severely mentally retarded persons could provide more knowledge and probably increase the size of the user group.

We are also seeing possibilities in testing and evaluating telefax as a communication aid for persons who are slightly mentally retarded. In Swedish Telecom's project "Telematics and Disability" there is a sub-project dealing with home telefax. In this sub-project, no mentally retarded persons have been involved. Based on our recent knowledge and the experience from our evaluation of Panasonic's still picture telephone for moderately mentally retarded persons, we are seeing some possibilities of enlarging the home fax project to comprise even mentally disabled persons. With telefax, even Pictograms, Blissymbols and pictures can be transmitted. With some new equipment, telefax transmission is very simple to handle. Using a fax machine of the type where the original can be placed face down on a glass plate in the same way as on a copier, the mentally retarded person only needs to learn a few operations. Telefax transmission can then consist of calling a receiver (e.g. using and automatic dialler), placing a picture or a Pictogram letter on the telefax, put the lid down and pushing a button for transmitting the message.

A third possibility which can be seen from the empirical study is to go on working with transmission of moving pictures for mentally retarded persons who use sign communication. Some of the project participants would have had good use for moving-picture communication, especially people who are only slightly or moderately mentally retarded. We see it as important to find out, already at an early stage, which possibilities there are for mentally retarded persons to use this new technique, not as the last possible group of disabled people, but as one of the first. Mentally retarded people are a neglected group when it comes to technical aids, and according to a Government report (SOU 1990:19, from "1989 års handikapputredning") it is important to intensify measures for the weakest groups in Society for the ones with the greatest functional disorders.

Because a mentally retarded person has an intellectual functional disorder, the new technique seems to offer many possibilities to facilitate the daily life of these persons. If used right, the new technique

can give mentally retarded people great opportunities for development and independence provided that it is adapted and made available.

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Appendix 1a

Telematics and Mental Retardation

The project "Telematics and Intellectual Disability" is managed by Swedish Telecom and The Swedish Handicap Institute. Its purpose is to evaluate Panasonic Still Picture Telephone.

In the project there are three day activity centres with together 5 mentally retarded adults. In addition, there are two school children aged 10 and 12 and a 7-year-old child who is beginning to go to school and spends the afternoons in a day nursery. In total, thus, 8 mentally retarded persons are included in the project.

The day activity centres are bases for the adults. For the children, the home and the family are the bases. Every base station receives a form for background information. This information will be the basis of a description of every person in the project, because this is necessary for understanding which groups the still picture telephone can be an aid for. We want to point out that this material will be de-individualized, eliminating all information which could enable outsiders to identify the persons. However, the identity of the day activity centres will be indicated because it may be valuable for personnel in other day activity centres to know about the project. We will make video recordings of some of the persons at the start of the project and after four months of training. The recordings will be used only as material for analysis and will not be shown without special permission by parents/contact person/personnel.

We want to find out how useful the still picture telephone will be in increasing understanding of telephony and if this can be a way to increase motivation and thus independence in the persons involved in the project.

Finally we want to declare that we adhere to the ethical rules that are in effect for research projects.

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Appendix 1b

Telematics and Mental Retardation

Below, the test person is called NN.

NN is supposed to make at least 2 telephone calls every day during the test period, extending from September 1 until December 31 1990. The cost for still picture telephoning is not higher than it is for ordinary telephone calls. If you wish compensation for the extra telephone costs, we would like you to make notes of the number of calls and perhaps calculate the extra cost.

It is important that you make notes of which procedure you use for telephoning and which instructions you give to NN during telephoning, enabling us to benefit from your ideas and forward them to other persons who will later use the still picture telephone as an aid. The purpose of the diary notes is to give a comprehensive picture of the development of training and telephoning. Here, we want you to describe any special events in connection with the use of the still picture telephone.

The diary notes should be kept continually, and they should summarize every week's experiences of training and telephoning. Every two weeks we would like to get a filled-out report for each week.

Practical difficulties should be described in the diary notes, such as inability to use the still picture telephone, e.g. because of sickness or other absence.

Please include a description of the first telephone call made by NN with your assistance. You can describe his or her reaction by reporting what has been said and which pictures have been transmitted over the telecommunication network.

Also, please describe the first time that NN made a call on his or her own. Report what was said, which pictures were sent and how NN reacted.

How does NN react to his or her own picture on the screen? Any changes?

How does NN react to the picture of the other party? Any changes?

We would also appreciate reports on any events and episodes in connection with the use of the still picture telephone.

Appendix 2

Telematics and Intellectual Disability JB/EBÅ 9008

Station . . . . . .

Background Description

Person . . . . . **Sex** . . . . . **Age** . .

Housing conditions
Earlier (for persons living in an institution, please indicate approximate size) . . . . . .

. . . . . .

. . . . . .

. . . . . .

. . . . . .

. . . . . .

. . . . . .

. . . . . .

Present . . . . . .

. . . . . .

. . . . . .

. . . . . .

. . . . . .

Schooling

Class for
mentally retarded children Number of years . . . . . .

Class for severely
mentally retarded children Number of years . . . . . .

Other Number of years . . . . . .

None . . . . . .

Schooling finished Year . . . . . .

Main occupation in day activity centre

. . . . . .

. . . . . .

. . . . . .

Social contact network

Has contact with	(Tick relevant alternative)		
	Daily	Every week	Sporadically
Mother			
Father			
Siblings			
1.			
2.			
3.			
4.			
Relatives			
1.			
2.			
3.			
4.			
5.			
Friends (or personnel during leisure time)			
1.			
2.			
3.			
4.			
5.			
Contact person			

Spare time interests . . . . . .

. . . . . .

Degree of mental retardation . . . . . .

. . . . . .

Assessed by

. . . . . .

Basis for diagnosis (if possible, please indicate which tests have been used and when the assessment has been made) . . . . . .

. . . . . .

. . . . . .

Additional functional disorder

Sight _____ Yes _____ No

Type of visual impairment . . . . . .

. . . . . .

Glasses have been prescribed _____ Yes _____ No

Uses glasses daily _____ Yes _____ No

Needs enlarged text _____ Yes _____ No

Hearing _____ Yes _____ No

Type of hearing impairment . . . . . .

. . . . . .

Hearing aid has been prescribed _____ Yes _____ No

Uses hearing aid _____ Yes _____ No

Motor impairment _____ Yes _____ No

Type of motor impairment . . . . . .

. . . . . .

Uses mobility aid _____ Yes _____ No

Type(s) . . . . . .

. . . . . .

Epilepsy _____ Yes _____ No

Medication _____ Yes _____ No

Speech impairment _____ Yes _____ No

Medical disorders _____ Yes _____ No

Type . . . . . .

Other . . . . . .

Coarse motor impairment _____ Yes _____ No

Type . . . . . .

. . . . . .

Fine motor impairment _____ Yes _____ No

Type . . . . . .

. . . . . .

Pictures

Recognizes objects in pictures _____ Yes _____ No

Recognizes persons in pictures _____ Yes _____ No

Recognizes symbols (Bliss, Pictograms) _____ Yes _____ No

Recognizes digits, letters _____ Yes _____ No

Recognizes persons in photos _____ Yes _____ No

Uses pictures/symbols for communication _____ Yes _____ No

Uses pictures

for marking his/her environment _____ Yes _____ No

Communication/language

Is motivated for communication _____ Yes _____ No

Communicates by means of speech _____ Yes _____ No

Communicates by means of signs _____ Yes _____ No

Principal way of communicating

(please indicate even combinations) . . . . . .

. . . . . .

Use of communication aids _____ Yes _____ No

Type . . . . . .

. . . . . .

Initiates communication:

___ always ____ often ____ sometimes ____ seldom ____ never

Responds to communicaton:

___ always ____ often ____ sometimes ____ seldom ____ never

Telephoning

Uses the telephone:

___ daily ____ sometimes ____ seldom ____ never

Calls the following persons:

. . . . . .

. . . . . .

. . . . . .

Recognizes telephone voices
of persons in his/her environment _____ Yes _____ No

Recognizes different telephone signals _____ Yes _____ No

Can establish a call on his/her own _____ Yes _____ No

Can answer the telephone

on his/her own _____ Yes _____ No

Please describe the normal procedure for telephoning

. . . . . .

. . . . . .

. . . . . .

. . . . . .

. . . . . .

. . . . . .

. . . . . .

lease describe an ordinary weekday in the test person's life (normal routines, occupation, contacts etc.)

. . . . . .

. . . . . .

. . . . . .

. . . . . .

. . . . . .

. . . . . .

. . . . . .

. . . . . .

. . . . . .

Appendix 3

Diary notes

Date . . . . . .

Appendix 4

Record of telephone use

Station . . . . . **Incoming** . . . . . **Outgoing**

Date . . . . . .

Time of day . . . . . .

Call duration . . . . . .

Call partner . . . . . .

Initiative taker . . . . . .

Reason for call . . . . . .

Conversational subjects . . . . . .

Does NN show motivation/interest

in the training _____ Yes _____ No

Please indicate in which way . . . . . .

. . . . . .

. . . . . .

Please circle the word(s) best describing NN's attitude to using the telephone:

fun exciting interesting anxious unpleasant angry sad

dull difficult indifferent uncertain demanding frustrating

Which pictures were sent over the telecommunication network?

. . . . . .

. . . . . .

. . . . . .

. . . . . .

. . . . . .

. . . . . .

Infologics forms a part of the Infologics Group which develops, produces, and sells services in the fields of telecommunication and data communication. The Infologics Group is owned by Swedish Telecom and has 200 employees. Besides Infologics (the mother company) the Group comprises Infovox, Mimer Software, TeleLOGIC, TeleDelta and Telesoft/Upsala.

Within Infologics, the Telematics and Disability Group develops new communication systems for persons with disabilities. The work is carried out in close cooperation with the Swedish Handicap Institute and the disability movement.

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